THE MODEL ENGINEER

INSIDE—
Data Supplement on SOLDERING

IN THIS ISSUE

JULY 8th 1954
Vol. 111 No. 2772

9D

This is a H.S. Milling Cutter Bargain. All 1″ bore, 3″-3½″ dia., ½″-¾″ thick, including side and face cutters, plain and angle cutters. A most useful lot for any tool room, 6 ass. for 50/-. The present makers price of the cheapest cutter in this selection is 40s. You must get this lot, remember you get same on approval against cash.

500 Toolmakers' Vee Blocks, 1½″ square, 2″ long, precision machined and ground, one side large Vee opposite side small vee, complete with clamp. Worth 27/6 per pair. An essential tool for any engineers shop. Clear, 15/- per pair.

300 H.S. Counterbore Drills, 13/32″ dia. pilot drill, ⅞″ counterbore drill. No. 1 M.T. shank, 7/6 each.

350 Interlocking Cutters, side and face, 3″ dia., 1″ hole, ⅜″ wide. Two separate cutters, bargain 30/- pair. Actual value £5.

2,000 Small H.S. Twist Drills, approx. 1/32″-3/32″, 4/- doz. approx.; 1/16″-¼″, 7/6 per doz. approx.; 9/32″-15/32″ six for 10/-.

250 No. 1 and 2 M.T. Shank Twist Drills, slightly used, but re-ground as good as new, 27/64″-1⅞″. Very handy lot. Six ass., 27/6.

All items brand new. £1 orders post paid. Prompt delivery. Inspection by appointment only. All items sent on approval against cheque or P.O. Refund without question if any item returned.

2,000 H.S. Side and Face Cutters, 1″ hole 2½″ dia., ¼″ thick, 15/-; ⅜″ thick 17/6; ⅜″ thick 20/-. 3″ dia., ¼″ thick 17/6; 5/16″ thick 20/-; ⅜″ thick 22/6; ½″ thick 25/-; ⅝″ thick 27/6. 3½″ dia., ¼″ thick 20/-; 5/16″ thick 22/6; ⅜″ thick 25/-. 5″ dia., ¼″ thick 55/-; 1″ thick 65/-.

5,000 H.S. Morse Taper Shank End Mills, spiral teeth. No. 1 shank ¼″ dia. 6/6, 5/16″ dia. 7/6, ⅜″ dia. 7/6, ½″ dia. 8/6. No. 2 shank ⅜″ dia. 10/6, ⅜″ dia. 12/6, 11/16″ dia. 12/6, ¾ dia. 14/-, ⅞″ dia. 15/-. No. 3 shank 1¼″ dia. 22/6. No. 4 shank 1⅜″ dia. 25/-, 1½″ 27/6, 1¾″ 35/-, 1⅞″ 40/-. No. 5 shank 2″ dia. 50/- each.

3,000 Circular Split Dies 1″ dia. cutting ¼″, 5/16″, ⅜″, 7/16″, ½″ Whit., B.S.F., also brass thread, 26 thread all sizes and American N.F. 12/- per set of 5 sizes, 2 sets 22/6, 4 sets 42/6. Taps to suit 9/3 per set, either taper or second or plug. 1″ die-stocks 5/- each; ⅛″ to ½″ tap wrenches 12/6 each.

2,000 H.S. Long Twist Drills all straight shank 1/16″ to 5/16″ dia. 4″ to 6″ long, 5 assorted, 10/-. Would cost much more than treble this price.

500 H.S. No. 1 M.T.S. Twist Drills, ¼″ to ½″ dia., 3 ass. 10/6, our selection; 6 for £1.

1,000 Hand Reamers, ¼″, 5/16″ and ⅜″, 8/6 per set of three; 3/6 each.

1,000 High Speed Inserted Blades Expanding Reamers, 17/32″ to 19/32″ 14/-, ⅝″ to ⅞″ 16/-, 11/16″ to ¾″ 17/6, ¾″ to 27/32″ 17/6, ⅞″ to 31/32″ 18/6, 31/32″ to 1¼″ 22/6 each.

100 H.S. Concave Cutters, dia. of circle 5/16″ or ⅜″, cutter dia. 2½″ hole 1″, 12/6 each.

1,000 High Speed Parting Off Tool Blades, Eclipse brand: ⅛″ × 3/32″ × 4½″ long, 4/- each; 11/16″ × 3/32″ × 5″ long, 5/- each; 1/16″ × 1/16″ × 6″ long, 5/- each; 1/16″ × 3/32″ × 6″ long, 6/- each.

7,000 Pratt & Whitney, circular split dies, superior quality precision ground cutting edges, 13/16″ dia., suitable for machine or hand use. Sizes: 2, 4, 5, 6 B.A., 8/6 per set.

1,000 Extra Long Twist Drills, straight shank, H.S. and carbon, 5/16″ to 9/16″ dia., 6″ to 8″ long, six assorted 15/-.

5,000 Ball Races, ⅛″ bore, ⅜″ o.d., ⅛″ thick, 4/- pair; ¼″ bore, ⅜″ o.d., 7/32″ thick, 4/- pair; 6 mm. bore, 19 mm. o.d., 6 mm. thick, 4/- pair. 12 mm. bore, approximately ½″, 35 mm. o.d., 9 mm. thick, 4/- pair; 9 mm. bore, 26 mm. o.d., 8 mm. thick, 4/- pair; ⅜″ bore, ⅞″ o.d., 7/32″ thick, 5/- pair.

4/9 Any LOT. Five lots 22/6. 2 H.S. Tap or Reamer Fluting Cutters 1¼″ dia., ⅜″ hole, ⅛″ and 5/16″ thick, worth 7/6 each. Set 5/32″, 3/16″, 7/32″, ¼″, all in 40 thread, 13/16″ Split Dies: 8 assorted Centre Nail Pin and Belt Punches, total value 12/6; one H.S. Tap or Reamer Fluting Cutter, 2¼″ dia., ⅜″ thick, ⅞″ hole; one ⅜″ H.S. Hand Reamer, worth 10/-. Every item a good bargain.

500 Sets Metal Figure Punches, nine punches 0 to 8, the six is used reverse for nine; size 5/64″ 6/6 set, worth 15/-; ditto 1/16″ size, 8/6.

3,000 High Speed Tool Bits, ⅜″ square, 3″ long, hardened ready for use, 12/6 doz., 3 doz. 35/-. Ditto 1/16″ round, 3″ long, 8/6 per doz.

2,000 Files, 4″ to 6″ flats, half-rounds, rounds, squares, warding assorted, cuts, good general lot, 10/6 doz.; three doz. 28/6.

600 Circular Split Dies, B.T.D. make ¼″ dia., 5/16″, ⅜″, 7/16″, 1″ Whit. ⅜″ Gas; worth 11/- each. Clear 7/6 each, new 2¼″ die-stock to suit, worth 30/- each, clear 10/- each.

200 Boxes A to Z Steel Letter Stamps for marking metal, 5/64″ size, 17/6 set; ditto ⅛″ size, 22/6 set, worth treble this price.

2,000 Straight Shank End Mills, size 1/8″, 5/32″, 3/16″, 7/32″, ¼″, 5/16″, list price 30/- set, handy bargains, 15/- set, also ⅜″, 7/16″, ½″ ditto 12/6 set, all in makers' wrappings.

500 H.S. 90° Countersinks, body ¼″ dia., teeth cut to point. An essential tool for any workshop using c/s screws. Gift 5/- each.

1,000 Bevelled Wood Chisels, handled, 1/16″, 5/16″, ⅛″, ¼″, 5/8″, ¾″, 7/8″, 1″. Actual value 32/6. Gift 21/- set.

2,000 Rotary Files, 3/32″ shank, various shapes. Six for 6/6, 12, 12/-. Very handy.

3,000 High Speed Routing Cutters, straight shank, two lip, as used for cutting slots in wood, sizes ⅛″, ¼″ dia., clear 4/- each.

1,000 Toolmakers' Needle Files, good assortment of shapes and cuts, worth 1/9 to 2/6 each, 12/6 doz.

200 Ace Dial Gauges. 2½″ face, reads to 0.001″, plus and minus, very useful instrument, worth 60/-, gift 45/-.

300 High Speed Straight Shank End Mills, ¼″ dia., 10/- each.

20,000 High Speed Milling Cutters. Counterbores and Countersinks, Radius and Angle Cutters, ⅛″-1¼″ dia., 10 assorted 25/-. Actual value 5/- to 15/- each.

10,000 High Speed End Mills Straight Shank, 3/32″ to 5/16″ dia., some with teeth cutting both ends but not standard sizes, clear 5 assorted, 10/-.

200 Cast Steel Circular Saws for Wood, 4″ dia., 6/- each; 6″ 10/-; 8″, 13/6; 10″, 18/-; 12″, 24/-. Larger sizes. Prices on application.

50,000 Brass B.A. Screws, 2, 4, 6, 8 B.A. Various type heads most useful stock. 2 gross ass. 4/9.

100 doz. 6″ Three square Saw Files, 10/6 per dozen.

1,000 Carborundum Grinding Wheels, fine and medium coarse, useful pair for tool grinding 6½″ dia., ½″ thick, 1″ hole, 7/9 per pair. Easily bushed to suit your spindle. Actually worth more than double. Also 5″ dia. cup wheels ½″ hole medium coarse, 4/9 each. Also 6½″ dia. ½″ thick, ⅝″ hole, 4/9 each.

1,000 H.S. Taper Pin Reamers, 7/32″ size, 5/- each, also Nos. 5, 6, 7, 8, 9, 10, 5/- each. 30/- set of 7.

500 H.S. Angle Cutters as used for milling teeth in slitting saws and milling cutters. Actual value £3 each. 2½″ dia., 1″ hole. Clear 25/- each.

400 H.S. Milling Cutters and Angle Cutters, 1½″-2″ dia., ⅝″ hole, 4 ass. 22/6. Useful bargain.

100 H.S. Slotting Cutters, 5″ dia., 5/16″ thick, 1″ hole, 12/6 each.

200 H.S. Slitting Saws, 8″ dia., 3/32″ thick, 1″ hole, 20s. each. Also 5″ dia., 1/32″ to 3/32″ thick, ¼″, ⅜″ and ½″ holes, 6s. each. 3 for 15s.

1,000 "Leytool" Ratchet Spanners, 1/16″, ⅛″, 5/16″, ⅜″, 7/16″, ½″ Whit. Makers' price 70/- per set. Very useful bargain, 35/- per set.

100 H.S. No. 1 M.T. Shank Reamers, 7/16″ dia., 7/6 each.

1,000 Semi High Speed Centre Drills, Slocombe brand, 5/16″ body diam., 3/32″ points, 1/6 each, 16/6 per doz.

J. BURKE, 192 Baslow Road, Totley, Sheffield

Inspection Only at Rear 36, Fitzwilliam St., Sheffield.

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CONTENTS

Our Cover Picture

This photograph depicts an operation on the armature of an electric motor which, while not strictly classifiable as model engineering, is one that many of our readers may be called upon to perform. The armature in question has been rewound, and the ends of the windings are being soldered to the commutator bars; the success of the operation depends very largely on obtaining a sound joint, both electrically and mechanically, at these connections, not to mention others in the field and armature systems.

Soldering operations are involved in nearly every department of electrical and mechanical engineering, and a knowledge of the technique, and the composition of solders and fluxes for various classes of work, is therefore an important item in every engineering craftsman's stock-in-trade. The supplement on this subject, given in this issue, will, therefore, we trust, be found very useful to many of our readers who encounter soldering problems or who seek to extend their knowledge of processes and applications.

SMOKE RINGS

Our Supplement

WITH THIS issue is included the first of a series of supplements; it will be found to be easily detachable from the body of the magazine and folded into a separate eight-page booklet. It provides the reader with much essential information on solders and soldering, for knowledge of these materials and how to use them has to be acquired, sooner or later, by model engineers everywhere.

As circumstances permit, other supplements will be published, each in similar form and dealing with some topic, or process, of interest and use to model engineers.

To make up the booklet, carefully detach the four pages from the magazine, fold them as in the journal and then fold them again, along the dotted line printed on the first page; now cut along the top dotted line to form eight pages that can be opened in the normal way. To make a permanent booklet, the separate leaves should be stapled or sewn together.

A Fishy Story

WRITING IN the "Boat News" column of the *Bulletin of the Sydney Society of Model Engineers* for June, "Admiral" Bob Meiran states: "Strange as it may seem, we have discovered some very nice, plump, golden carp browsing around in the placid waters of our ditch. Goodness knows how long they have been there, and how they manage to escape being filleted every Saturday is more mystery than I am prepared to solve; but I do know that they would look quite nice laid out on a plate and garnished with golden brown "murphies'."

We think that "our ditch," mentioned by Mr. Meiran, is quite a sizeable stretch of water, and that may have some bearing on the fact that those palatable golden carp escape without a scratch every Saturday. Anyway, Mr. Meiran is considering the possibility of trying his luck with rod and reel; for, after all, if he should succeed in landing only one fish by this means, the chances are that it *would* be a fish, a whole fish and nothing but a fish, which might not be the case after a collision with a 50-m.p.h. power boat!

A Magician's Side-line

MR. ERIC HAWKESWORTH, a well-known magical entertainer in the Midlands, and regarded as "Uncle Eric" to most of the children thereabouts, has spent some six years of spare time in building a 7¼-in. gauge L.M.S.R. "Royal Scot" locomotive. During this summer, he writes, he is running it in West Park, Long Eaton, Notts, and he adds: "This being my first model, I would like to express my thanks and appreciation for the wonderfully helpful advice and information in THE MODEL ENGINEER—in particular to "L.B.S.C."—but, look you, to all."

To have tackled such a job as a 7¼-in. gauge 4-6-0 locomotive as a *first model*, shows courage, determination and enthusiasm, to say the least.

Deeside Revival

IN A letter from Mr. Frank E. Mills, of Shotton, he states that, after a very long period of inactivity, an attempt is being made to revive the Deeside Model Engineering Society. At a recent meeting, Mr. Mills was elected hon. secretary. Every Wednesday evening during this summer is to be a track night. The society's 550-ft. track, accommodating 3½-in. and 5-in. gauges, is near Hawarden Bridge Halt, on the Chester-Wrexham and Seacombe-Wrexham lines of B.R., and visitors will receive a warm welcome.

Meanwhile, former members, and anyone else interested in helping the society to resume its activities, are invited to communicate with Mr. Mills, whose address is: "Lovedale," 8, Taliesin Avenue, Shotton, near Chester.

"Sam"—A Simple Adding Machine

By J. Newbert

"Sam"—The finished product

"SAM" is an illustration in point of the old tag: "Necessity is the mother of invention." The addition of large batches of percentages, often three to four hundred, is to me a frequent and deadly prospect. This was, however, Sam's *raison d' etre*, and he thrives on it. He also applies himself to other additions, from checking time sheets to adding dart scores !

The photograph gives an idea of his small size, $4\frac{1}{8}$ in. × $2\frac{3}{4}$ in. × $1\frac{1}{2}$ in., and neat appearance, which go a long way to making him a pleasure to use.

General Construction and Working

Two Veeder counters, 0-999 with reset, are mounted on a baseplate, the one counting the "units" column to 999, the other counting the "tens" column to 9990. The counters are arranged so that all the tens are in one column, the hundreds in another and so on.

The small operation of carrying is the only mental effort required, no matter how many items are to be added.

The figures are fed into "Sam" by a stylus working in an endless chain and thus actuating the Veeder counters.

Veeder Counter Assembly

A start should be made on the baseplate, using the 16-s.w.g. sheet. This should be developed, cut out, and the side bent at right-angles, as shown in Fig. 1. Following this, make the Veeder counter bracket from 10-s.w.g. sheet brass. Particular care should be taken over this to ensure that the two mounting faces are in parallel planes, and that both are at right-angles to the base. On the accuracy of this depends the smooth working of the reset gears, and of the counting mechanism. Drill and tap the three 6-B.A. holes in the base and mount the Veeder counter bracket on the baseplate. Since the exact position of these holes is not critical, no sizes are given on the drawing, but care must be exercised to ensure that the faces

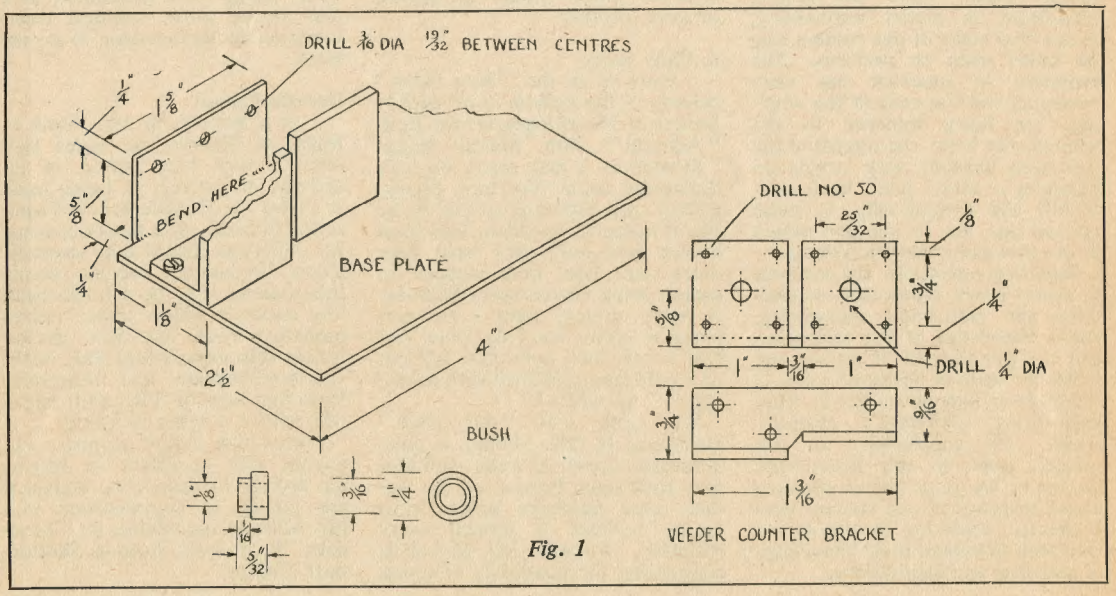


Fig. 1

on the Veeder counter bracket are mounted parallel to the vertical side of the baseplate.

Having screwed these two items together, mark out carefully with a surface gauge the positions of the drilled holes in both items. This method will best ensure that the centres are in line and the driving shafts run true. Remove the Veeder counter bracket, drill all holes, and, using soft solder, sweat a bush (shown in Fig. 1) into each of the $\frac{3}{16}$ in. diameter holes in the side of the baseplate.

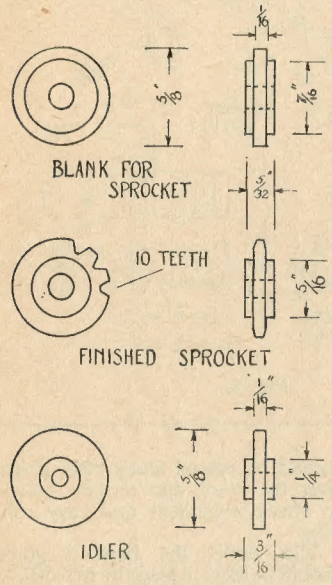


Fig. 2.

Sprockets and Shafts

From the $\frac{3}{4}$ in. diameter brass rod, next turn the two blanks for the counter sprockets shown in Fig. 2; drill and tap them 3 B.A. Mark out on the circumference of the $\frac{5}{8}$ in. diameter the ten teeth. File these carefully down to the $\frac{7}{16}$ in. diameter using a three-square file to give 60 deg. between the working faces of the teeth. This will give ten teeth of 5/32 in. diameter pitch, at the correct pitch circle. This done, return the sprockets to the lathe, spigot mounted, and reduce the two outer bosses to $\frac{5}{16}$ in. diameter in order that the sides of the chain shall be clear of the sprocket when in use. The two driving shafts, Fig. 3, are next turned from mild-steel, noting the difference in lengths between the units shaft and the tens shaft. Two other points concerning these shafts are: first, that care should be exercised to ensure the sprockets are a good fit on them, and are concentric, and secondly, by holding in a collet, ensure that the 3/32 in. diameter drilled hole is concentric, since this acts as a bearing for a reset shaft which protrudes from the Veeder counter. At this stage, the reduction gearbox which you will find attached to the Veeder counter is removed, and the 8-B.A. retaining-screws which held it in place should be shortened to $\frac{1}{2}$ in. and tapped, to $\frac{1}{8}$ in. under the head.

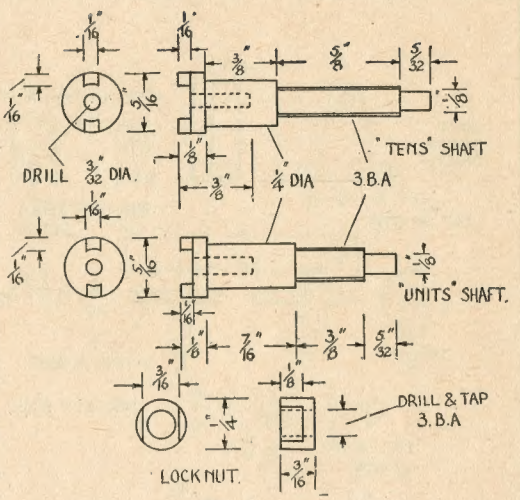
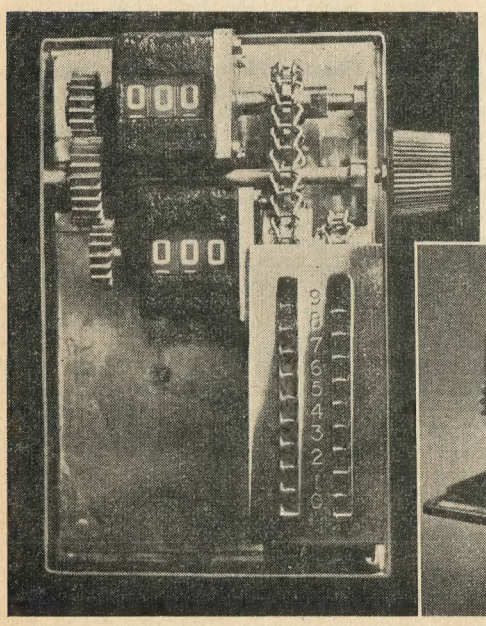


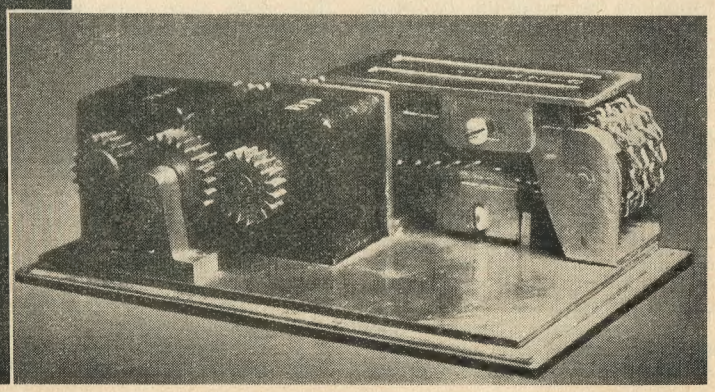
Fig. 3.

Using these screws, mount the Veeder counters, together with the shaft, on the Veeder counter bracket. Follow by assembling sprockets and lock-nut on the shafts, and screw



Left: General view, showing layout of Veeder counters, main reset shaft and counting plate. Note channel round baseplate into which the outer case drops

Below: Side view, showing reset bearing and adjustsments to counting plate, and chain tension plate



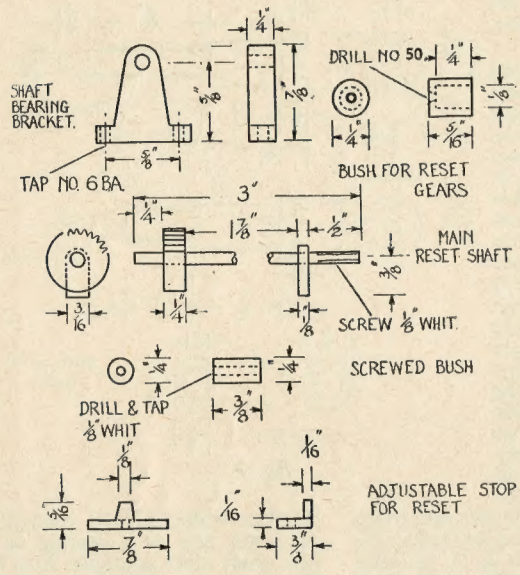


Fig. 4.

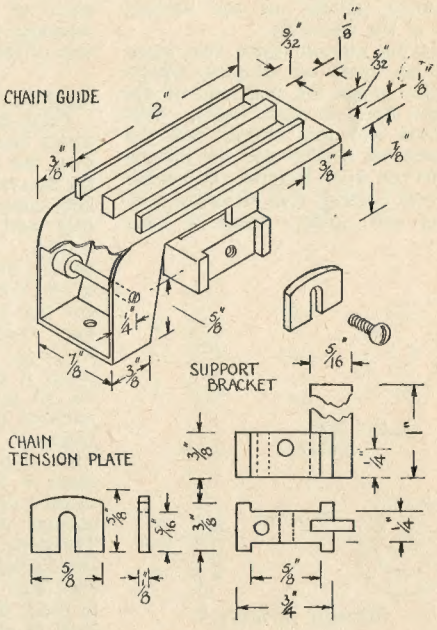


Fig. 5.

the whole assembly into place, with the shafts running in the bushes in the side of the baseplate.

Reset Mechanism

Having completed this first stage, you can sit back and "watch the wheels go round," including the reset knobs. A little careful observation of the latter will show that it needs *at least* one complete turn to bring all figures back to zero. Thus, by replacing the knurled reset knobs by 19-toothed gears, and driving these by a 25-toothed gear, one revolution of the latter will return all figures to zero.

Drill out and bush the 19-toothed gears with the bush shown in Fig. 4. Mount on the end of the shaft from which the knurled knobs have been removed, retaining them in place with the same 10-B.A countersunk screws which came out.

Bush the 25-toothed gear with a plain bush, and sweat in place on a 3 in. length of ⅛ in. diameter silver-steel, together with the brass arm shown in Fig. 4. This is the main reset shaft, which passes between the two bodies of the Veeder counters, running in the shaft bearing bracket (Fig. 4) at one end, and in the side of the baseplate at the other.

The brass arm extends vertically downward, coming to rest against the adjustable stop, which is drilled and tapped 6 B.A. and held by a machine screw in an elongated hole in the baseplate. This provides an adjustment to bring the figures exactly to zero each time. The screwed bush is fixed to the outer end of the shaft, ready for fitting the small wireless control knob.

Chain Guide and Tension Plates

The chain guide is made from 22-s.w.g. brass as shown in Fig. 5. After cutting to size and shape, but before bending, make the chain guide strips, the two outer ones from 16-s.w.g. brass, and the centre one from 10-s.w.g. brass. Bind down into position on the flat sheet, using iron binding wire, and silver-solder them into place, after which the complete chain guide may be bent to shape, and soft-soldered where necessary. A smooth curve at each end will provide an easy path for the chain to pass over.

The support bracket beneath the chain guide also holds the chain tension plates, by means of two 6-B.A. machine screws, as shown in Fig. 5. Finally the two idlers, Fig. 2, are mounted on a short length of ⅛ in. diameter silver-steel, and screwed into a bush which has been sweated at the rear of the chain guide, as shown.

At this stage, and just prior to fixing into place, a length of chain should be passed along each guide, over the idlers and tension plates, to check alignment and easy running.

This done, the finished guide should be fixed in place by two 6-B.A. machine screws, passing upwards through the baseplate, care being taken that the chain strips smoothly from both sprockets.

Counting Plate and Final Adjustment

The counting plate, which has two slots 5/32 in. wide, with ¼ in. space between, is engraved, as shown, with each number opposite a link in the chain. Thus the length of the slots is 10 times 5/32 in., i.e., $1\frac{9}{16}$ in. The elongated hole for adjustment purposes is made in a piece of 16-s.w.g. brass, and sweated to the side. This is held in place by a 6-B.A. screw, as shown in the photograph, a 6-B.A. nut being sweated to the chain guide.

The final adjustments for working are then made as follows:

(1) Adjust the reset mechanism to bring all zeros together in both windows. This is done by removing the 25-tooth gear, bringing all zeros into place and reinserting the gear in mesh with the arm against the stop. This is simpler than it sounds.

(2) Align the sprockets with the chain passages, and bring both

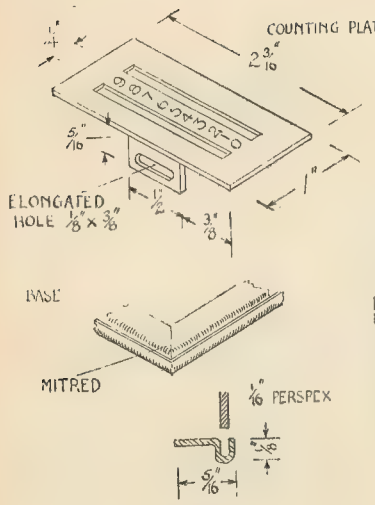


Fig. 6.

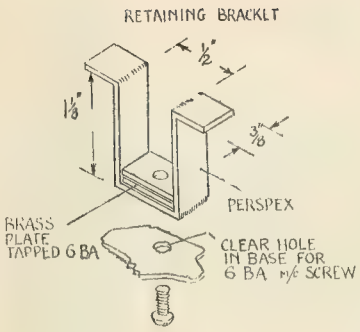


Fig. 7.

chains in step side by side. Lock the sprockets tightly in place with the lock-nuts.

(3) Take the back-lash out of the chains by raising the tension plates.

(4) Adjust the counting plate backwards or forwards, so that the ten spaces in the chain mesh come exactly opposite the ten numbers on the plate.

" Sam " Remembers

It will be apparent now that by pulling the chain, say, from the No. 8 to the No. 0 reading, you will have moved the sprocket 8/10ths of a revolution and hence the Veeder counter will have moved eight places. This can be done similarly for any number in both tens and units, thus you can arrive at the total for any number of figures fed into the machine. Furthermore, and this has distinct advantages, " Sam " will remember your total, and be ready to carry on should you be interrupted in the course of a long addition.

Base and Cover

Although these are not strictly part of the machine, there is no denying that a neat cover will make " Sam " much more pleasant and easy to use.

The cover shown is of black Perspex, $\frac{1}{16}$ in. thick with apertures cut for the counter windows, and an elongated hole through the right-hand side for the main reset shaft. The top, front and back are in one piece (formed by heating and bending over a wooden former), the sides being cemented on later, cleaned up and polished at the edges. The whole, when made, drops into a channel made of 22-s.w.g. brass sheet, running—picture-frame fashion—round the edge of the baseplate (Fig. 6). This cover is retained by a 6-B.A. screw passing upwards through the base into a tapped plate in the retaining bracket, which is cemented inside the cover. This bracket is shown in Fig. 7. If held thus, one screw only is required, and the cover presents a smooth, projection-free appearance.

Materials Required

Brass Sheet—6 in. × 6 in. × 16 s.w.g.; 3 in. × 3 in. × 10 s.w.g.; 6 in. × 6 in. × 22 s.w.g.

Brass Rod—3 in. × $\frac{3}{4}$ in. diameter; 3 in. × $\frac{1}{4}$ in. diameter.

Brass Bar—1 in. × 1 in. × $\frac{1}{4}$ in.; $\frac{3}{4}$ in. × $\frac{3}{8}$ in. × $\frac{3}{8}$ in.

Mild Steel Rod—6 in. × $\frac{3}{8}$ in. diameter.

Silver Steel—6 in. × $\frac{1}{8}$ in. diameter.

Two Veeder counters 0-999 with reset (ex-R.A.F.).

Eighteen No. 6 B.A. $\frac{3}{8}$ in. machine screws, round head, brass.

Two Meccano gears 19 T.

One Meccano gear 25 T.

Eighteen inch wire chain 5/32 in. pitch (Meccano or similar).

One small wireless control knob.

These quantities and sizes will be found ample to allow for reasonable waste and for holding in chucks, etc.

As described and illustrated, " Sam " cost rather less than £1 and, whilst he is not so versatile as the more expensive office machines, he performs efficiently and quickly many jobs that were formerly long and tedious, and which were provocative of language usually described as " unparliamentary."

For the BOOKSHELF

The Master Engineers, by Emmeline Garnett. (London: Hodder & Stoughton Ltd.). 223 pages, 5 in. by 7½ in. Illustrated. Price 12s. 6d. net.

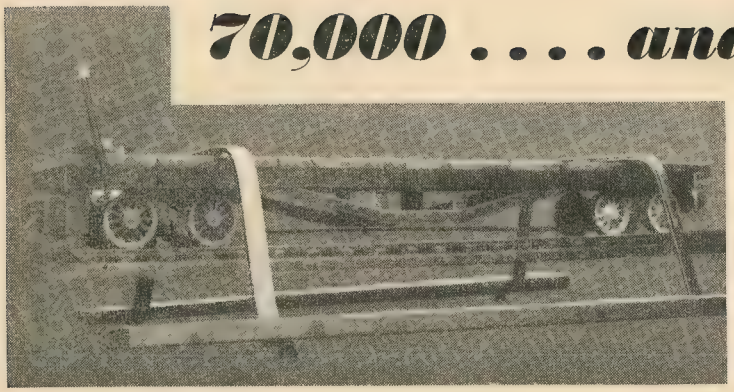
This is a companion book to its authoress's " The Railway Builders," and is written in the same delightful style; it tells the story of the two Brunels, father and son, and the great engineering achievements which, together and individually they brought to such outstanding completion. Brunel the elder, Marc Isambard, was one of those engineers who thought over the possibility of building a much-needed tunnel under the River Thames; but, unlike those who had preceded him in this idea, he had the courage of his convictions and put the idea into practice. This was in 1825, when there was no information available as to how such a tunnel could be made. Brunel, however, was so convinced of the feasibility of the scheme, provided that some method of construction could be discovered, that he spent some years in inventing and perfecting a shield in which men could work safely underground and be moved forward as the excavation proceeded. The apparatus was so convincing that the public did not hesitate to subscribe the funds required to enable the construction of the tunnel to be put in hand. Work went on for seven years, and then, due to unexpected difficulties, had to be abandoned because of lack of money; with financial support from the Government, however, 1840 saw the boring resumed and completed.

The story of Brunel the younger, Isambard Kingdom, begins with the Thames Tunnel, for which he was his father's Resident Engineer. But his name and energies were later to become inseparably associated with the planning, construction and early management of the broad-gauge Great Western Railway, with its tunnels, cuttings and great bridges, as well as with the mighty steamships, *Great Western* and *Great Eastern*.

The records of these two master engineers, together with much private history, are set down in this book in an easy style, free from abstruse technicalities, but with the various technical problems clearly and accurately presented. It is a book, not merely for children, but for young people who cannot fail to enjoy it and obtain inspiration from its pages.

70,000 .... and all that !

By J. H. Owen



One of the passenger cars with side guards omitted

THERE must be quite a large number of "Lion and Wheel Brand" daughters taking shape and nearing that day of days when they will move off under their own steam, and thereby afford their builders the great satisfaction that comes from long toil and patience rewarded at last.

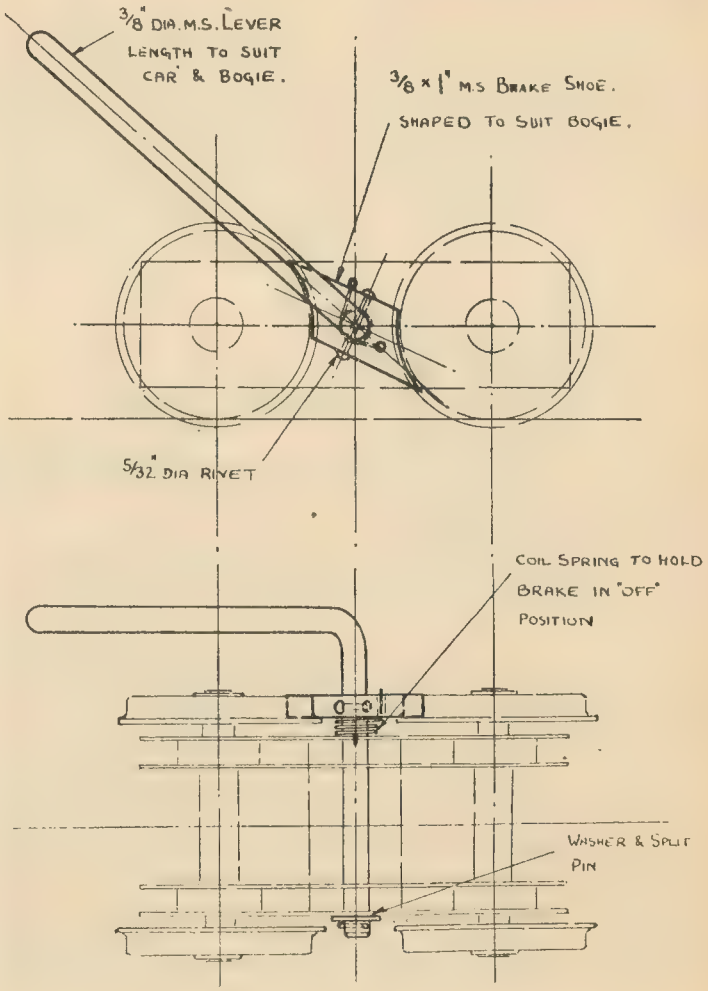
We've got a locomotive and maybe a tender as well, but to enable us to really enjoy life we want a flat car, too ! Now flat cars are simply a nuisance to most of us. An accessory very much after the fact, so to speak. But essential all the same. Apart from the difficulty of finding the time to make such things, I for one, can never work up much enthusiasm for them. However, experience has proved to me that it is just a sheer waste of time and energy to botch up any old thing on wheels, and certainly not fair to the little locomotive anyway.

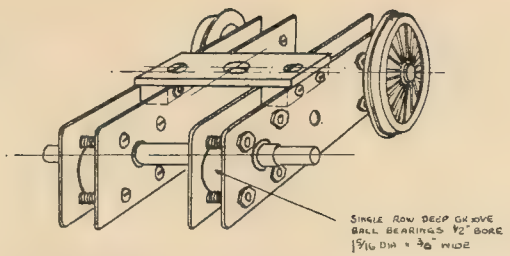
Easy to Make

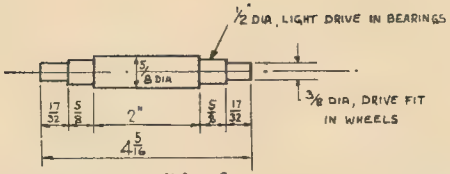
After trying a number of makeshifts in an endeavour to cut time and cost on flat car manufacture, I have arrived at a very simple design that is easy to make, and performs excellently in service. In fact, I have four cars to this design now, the first of which has been in use continually for ten years. Between them, all four cars have carried thousands of passengers (yes, literally thousands) and have done so without any trouble whatsoever. The only maintenance required has been the re-turning of some of the wheel treads, which had worn hollow with the wear and tear over the years.

The essential of any flat car is a good robust and free-running bogie, and for this, ball- or roller-bearings of as generous a size as possible are eminently desirable, to avoid overloading.

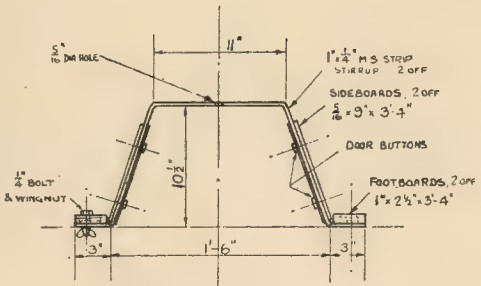
Being fortunate enough to possess a small stock of ½ in. bore deep groove single-row ball-bearings it was decided to use these, and sizes given on the drawings correspond to this bearing, but the construc-



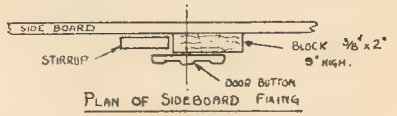




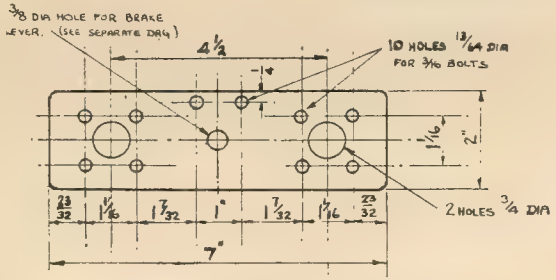
AXLES. M.S. 2 OFF PER BOGIE



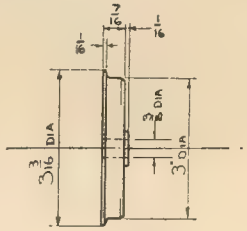
END VIEW OFF STIRRUP ASSEMBLY



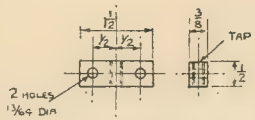
PLAN OF SIDEBOARD FIXING



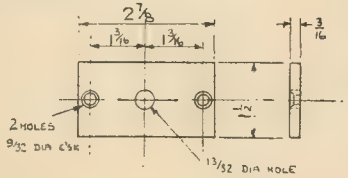
BOGIE SIDE PLATES 16 G. M.S.
4 OFF PER BOGIE.



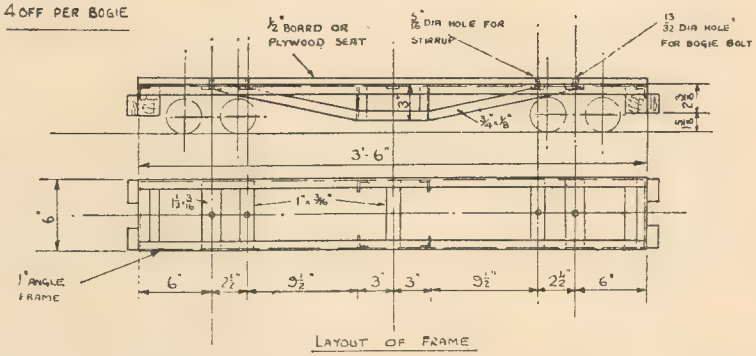
WHEELS C.I.
4 OFF PER BOGIE



SPACING BLOCKS
M.S. OR BRASS.
2 OFF PER BOGIE

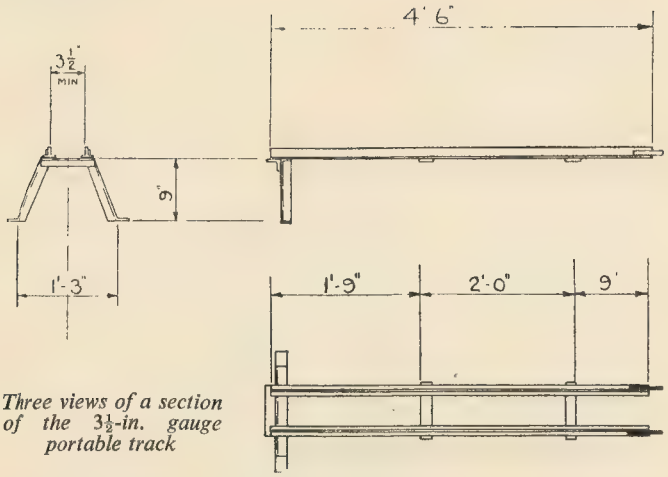


BEARING PLATE M.S.
1 OFF PER BOGIE.



LAYOUT OF FRAME

Constructional details for a 3½-in. gauge passenger car



Three views of a section of the 3½-in. gauge portable track

tional principles can be applied to other sizes as available.

A sketch of the bogies in perspective is shown and I don't suppose the design will please Inspector Meticulous at all, as it embodies neither springs nor equalisers. However, the appearance in the flesh is quite neat and, as I have said, the whole ensemble works well. On such a short wheelbase, track inequalities of an average nature don't worry us, and trouble has never been experienced with derailments from this cause on tracks all over the country.

The bogies will be seen to consist of twin pairs of plate frames, between each pair of which are sandwiched the ball-bearings. The latter are simply clamped in position by bolts passing through the plates. (No machining of bearing housings !) The axles pass through the bearings to the outside of the frames to carry the wheels. A variation of the arrangement can be made whereby the plates and bearings are located outside the wheels, but the resulting appearance, unless large wheels are used, would be more clumsy than with inside bearings.

Bogie Components

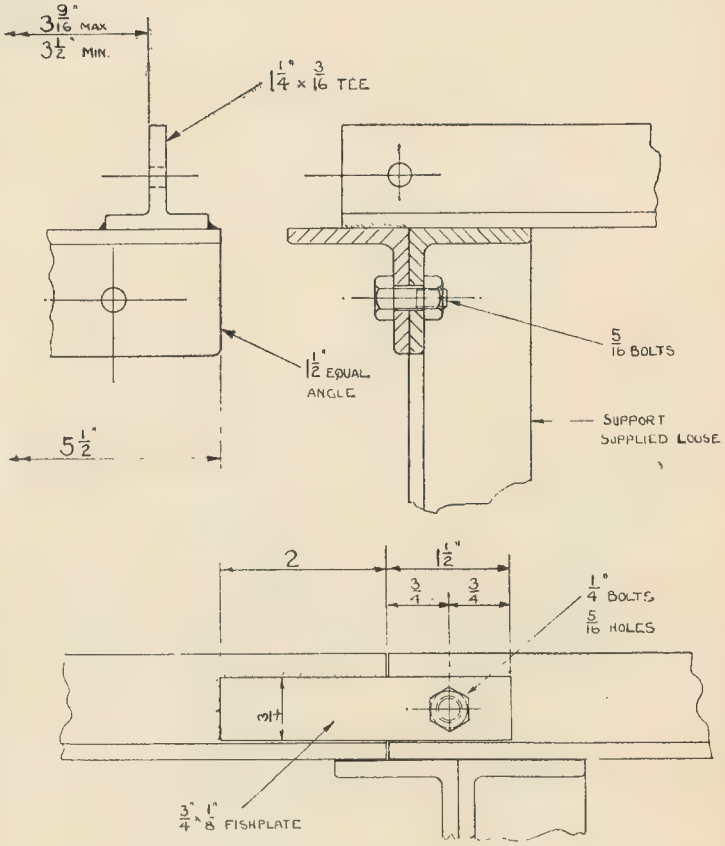
Details of bogie components are given, but dimensions can be varied to suit available bearings. The ball-races do not need to be self-aligning but if they are, so much the better, as this does give a bit more flexibility. Mine are not and, as I have said, do not suffer from undue rigidity in service.

To commence operations, cut out the eight frame plates (four per bogie). Mark out one plate to suit ball-races available and drill all necessary holes. Then use this plate as a drill template for the rest, clamping it to two or three other plates at a time and drilling through. Warning—don't clamp too many plates at one go, as the drill may wander a bit on its way through and the bottom holes will be further out than you think !

Axles and wheels are straightforward and *a la* " L.B.S.C." generally. The remainder of the bogie parts are, as the " maestro " puts it, " just a kiddies' practice job."

To assemble the bogies, put the inner pair of frame plates on the axles first, then press on the bearings. Then put on the outer plates and bolt up firmly, but not tight enough to buckle the plates. Trim off the ends of the bolts just clear of the nuts and rivet lightly to prevent the nuts disappearing when in service.

Wheels can now be pressed on and after that it is only a matter of fitting packing-pieces and stretcher



Details of the rail joints and supports for the 3½-in. gauge portable track

Three of the passenger cars in use on an oval track hauled by a 3½-in. gauge Urie-Arthur locomotive

plates to finish this part of the job. Another warning—do not try to spring any of the packings or stretchers, ease holes out to fit freely, otherwise the bogies won't run like roller skates. Place bogies on a flat surface and square up (not with a sledge hammer) and there you are !

The Brake

For use as a driving car, one of the bogies should incorporate a brake, and here again a very simple device works extremely well. A sketch of the brake is shown and is exactly the same as one I have had in use for years. It is positive and effective.

Two photographs are included, showing the flat cars. The close-up view shows the general arrangement and construction as per the drawing, except for the omission of the side guards for the sake of clarity. There is nothing elaborate about the cars, the stirrups, foot boards, and side guards being detachable for transport purposes. They are secured in service by bolts with wing-nuts. On the photograph of the car, the brake rigging is similar to the drawing but has been applied to both bogies and connected by a compensating lever. I have one car fitted thus and one with a single bogie brake only. My two others are unbraked trailer cars.

The pictorial photograph shows three cars in service on the short oval track at my brother's home, the engine being my ¾-in. scale Urie-Arthur. This engine is well known locally and has now put in eight years' hard work at local fetes and field days, as well as running many miles on the club tracks in Coventry, Birmingham and elsewhere.

Portable Track

As a matter of interest, a drawing is also given, showing my own design of portable 3½-in. gauge track which is used several times each year for charity fetes around Coventry.

It was first built ten years ago and has survived hard wear and rough handling for all this time, and is still in good condition. A fresh coat of paint every three or four years has been all that has been necessary.

Being limited to 4 ft. 6 in. in length it is easily transported and laid, and can take up quite a considerable curve if the site requires it, by means of slewing slightly at each joint ! The height from the ground is limited to 9 in. to underside of rails, and this gives reasonable comfort to the driver when riding and avoids the awkward feeling of having ones ankles wrapped round the back of ones neck. At the same time, the height is not enough to cause any serious falls, should passengers (both old and young, I regret to say) let their curiosity get the better of their balance when yielding to the temptation to lean over and watch the engines' wheels go round !

Who's Who IN MODEL ENGINEERING

W. J. HUGHES

The articles on traction engines and other subjects which are contributed regularly by Mr. Hughes give an adequate description of his model engineering activities, and interests. He was born in Sheffield in 1912 and educated at Central Secondary School, Sheffield, which later became High Storrs Grammar School. He is a schoolmaster by profession, and his subjects include woodwork, metal work, art and handicrafts generally. He has been seriously interested in model engineering for over 20 years. His first practical introduction was when he accidentally obtained a copy of *The Model Railway News*, previous to which he had dabbled in model work, but without proper knowledge or instruction.

Several of his models have secured awards and distinctions in exhibitions, including ½-in. scale Walton "Thames" Air/Sea Rescue Launch, an "M.E." cine-projector, and several steam plants for model power boats. He has held several executive positions in model engineering societies, including past Chairman and Public Relations Officer and present Member of Council, of the Sheffield & District S.M.E.E., Member of Council of Sheffield Trades Historical Society, and Ordinary Member of Newcomen Society and the Road Locomotive Society. In addition to his articles on model engineering, he is well known as the author of "Traction Engines Worth Modelling" and a contributor to other model text books.

He is also interested in photography, historical research on steam engine and marine subjects, painting, motoring and lecturing.

IN THE WORKSHOP
BY DUPLEX

AN ELECTRICAL MIXER

A Useful Appliance for the Home or Workshop

THE machine illustrated was designed in the first instance for mixing spraying paint and stoving enamel immediately before use, and for this purpose it has proved in every way successful.

During the rather tedious job of mixing a tin of paint, after it has been put away for a time, readers have no doubt found that the coloured pigment seems to keep rising to the surface even after considerable stirring, and if the paint is applied when in this condition a patchy appearance will result. It is here that a mechanical mixer saves time and trouble as, while other work is being attended to, it can be left running until the paint is thoroughly mixed. The machine can, however, be called on to do other useful work, particularly in the kitchen to undertake the mixing, stirring, and beating operations usually carried out by hand.

The Base and Column

Ordinary wood or plywood is suitable for making the base, but it should be covered with some kind of non-absorbent, easily cleaned, sheet material, such as Perspex or Formica. The column can be made from a length of cycle tubing, and the local cycle merchant is usually able to supply plenty of this useful material by cutting up discarded cycle frames damaged in road accidents. As shown in Fig. 3, the lower end of the column is furnished with a shouldered and threaded spigot which is cross-pinned and fitted with a draw-nut. The upper end of the column will have a more finished appearance if fitted with a plastic cap. The under side of the baseboard should be fitted with a rubber button at the four corners.

The Column Bracket

This part was machined from a length of duralumin bar; but, if preferred, it can be made in two parts with an inner tubular bush in order to save material.

The bracket is slit throughout its length so that it can be closed on the column by means of the handled clamp-bolt.

The front face of the bracket is formed with a threaded spigot to screw into the next part, the arm. This arm is internally threaded at either end, and is also slotted on the under side and drilled axially for the passage of the wiring leads to the motor. The mounting plate for the motor is screwed on to the end of the arm, and its dimensions are made to correspond with those of the motor base.

The Paddles

The stirring paddles may take the form of either a simple hook, a loop or a bladed disc similar to a propeller, and the type used will depend upon the viscosity of the material in the container. Thick liquids or mixtures may offer considerable frictional resistance and the simple form of paddle is then used, but for mixing thin-bodied

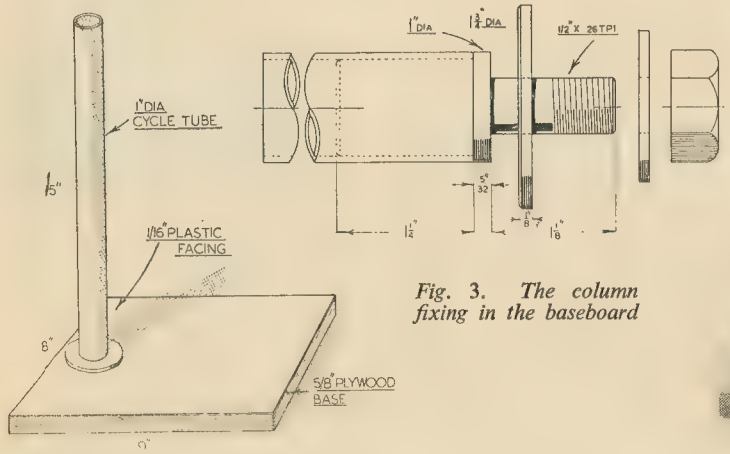


Fig. 3. The column fixing in the baseboard

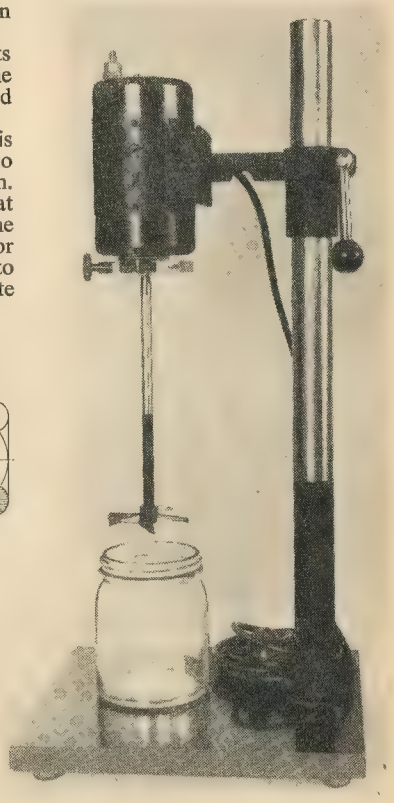


Fig. 1. The finished mixing machine

Fig. 2. The baseboard and column

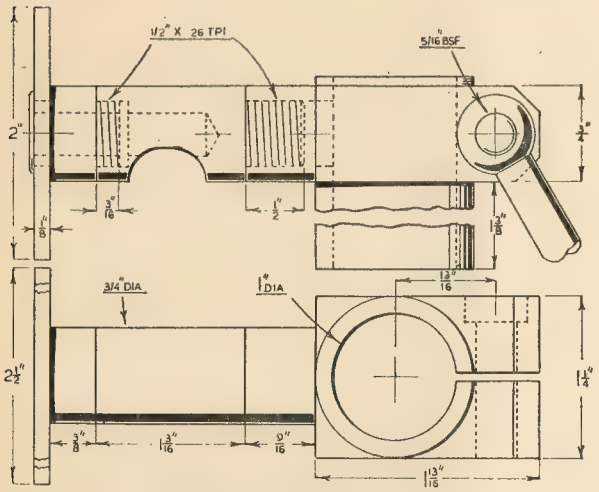


Fig. 4. The column bracket

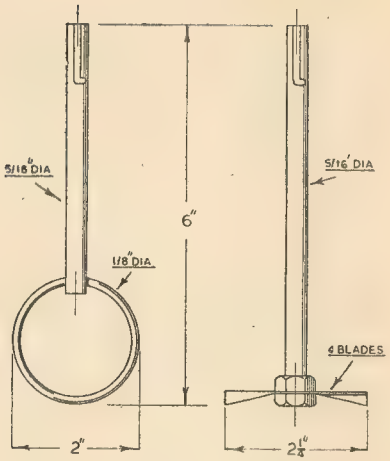


Fig. 5. Two forms of stirring-rods

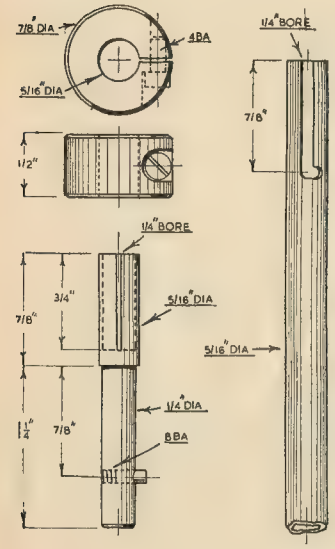


Fig. 6. Showing the method of attaching the stirrer to the motor spindle

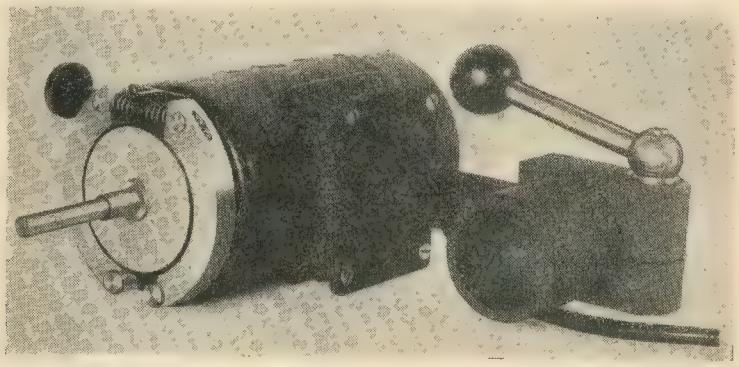
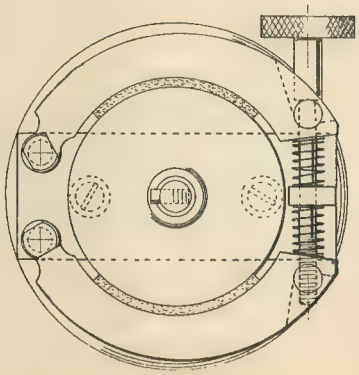


Fig. 7. The motor head with brake gear attached



Right: Fig. 8. Showing details of the braking system

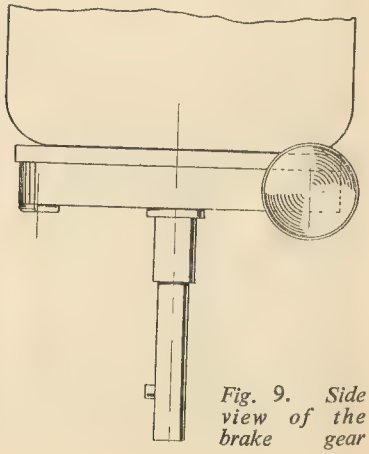


Fig. 9. Side view of the brake gear

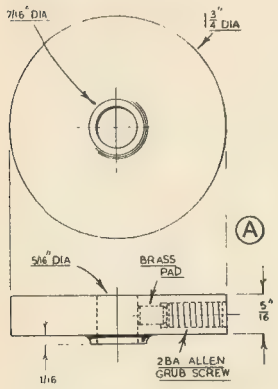


Fig. 10. The brake drum

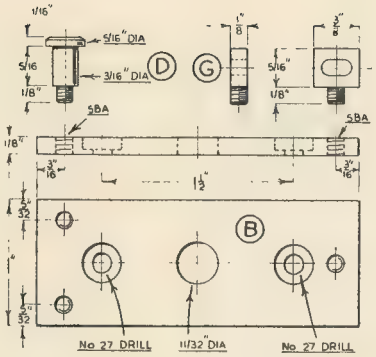


Fig. 11. The motor plate B; the brake shoe pivots D; and the brake screw trunnion G

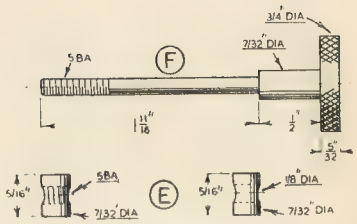


Fig. 13. The brake shoe trunnion nuts E, and the brake screw F

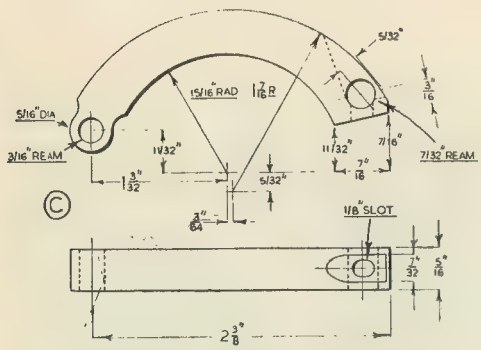


Fig. 12. The brake shoes

paints and similar preparations a vaned propeller will be found more efficient.

As shown in Fig. 6, the stem of the paddle fits on to a cross-pinned extension shaft, secured to the motor spindle by means of a split clamping-collar.

The Motor

A 250 V, a.c. motor of the series-wound commutator type is fitted, so that the speed can be varied to suit the material undergoing mixing.

Some of the machines sold as motors were originally designed for running on d.c. and transforming a 24 V input current to an output of some 250 V. In machines of this type the armature shaft does not extend beyond the bearings, but when they are used as motors the armature shaft will have to be fitted with a driving spindle. Although an extension of this kind is not difficult to fit, it is essential that the work should be properly carried out and the new part made fully strong to withstand the starting and driving torque exerted by the motor.

In a future article a simple way of adding a drive shaft to one of these machines will be described.

Although the liquid itself imposes a braking action on the motor, it was found that an additional braking system was needed to control the speed of the motor when mixing thin liquids.

For this purpose, as shown in Fig. 7, an external brake with contracting brake shoes was fitted to the motor.

The Motor Brake

The duralumin brake drum *A* is secured to the motor shaft with an Allen grub-screw and, for mounting the brake shoes, a plate *B* is attached to the end of the motor case.

The two leather-lined brake shoes *C* are attached to the motor plate by means of the two shouldered pivot-screws *D*, and the free ends of the shoes are fitted with internally-threaded trunnions *E*. The brake screw *F* has a bearing in the slotted trunnion block *G* which is screwed into the motor plate.

To keep the brake gear in the expanded position, two springs are fitted to the operating screw so as to hold the shoes apart.

In practice, the motor is suitably braked to prevent any tendency for a thin liquid to be thrown out of the container by centrifugal force, and it was found that the motor could, if required, be heavily braked and slowed right down without any sign of overheating. Should the container tend to rotate with the propeller, this reaction can usually be checked by standing the receptacle on a rubber mat, but there would be no difficulty in pivoting two wooden strips to the baseboard and putting a rubber band over their outer ends so as to press the strips against the container and hold it in place.

★ *Our Cover Pictures*

Readers of *THE MODEL ENGINEER* are invited to submit for consideration photographs which may be suitable for cover pictures. The subject must be within the scope of this journal and reference to the covers of this year's issues of the "M.E." will give an indication of the type of photograph preferred. If accepted for publication, a reproduction fee of two guineas will be paid.

Prints should be addressed to . . .

The Managing Editor
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MORE UTILITY STEAM ENGINES

Methods of Boiler Firing

By Edgar T. Westbury

A GENERAL review of the methods commonly employed for firing the boilers of small steam engines, including spirit lamps, blowlamps and atomising burners, was given in the earlier series of articles on " Utility Steam Engines " but I have received many requests for further articles on this subject, and in particular, for a complete design for a blowlamp suitable for an internal-flue type of marine boiler, as this type still continues to be the most popular for use in prototype steamboats.

Many recruits to model engineering are initially attracted to take an interest in the subject through witnessing the model regattas which take place regularly throughout the season in all parts of the country, and in which some excellent boats of all types are to be seen. Although the spectacular appeal of the racing craft is very strong, many novices feel that the construction of high-efficiency engines is beyond their ability, and prefer to take up prototype boats, in which less exacting demands are made on the power plant; there is no doubt that as a first attempt, one could not do better than to build a straightforward steam engine and boiler for this purpose.

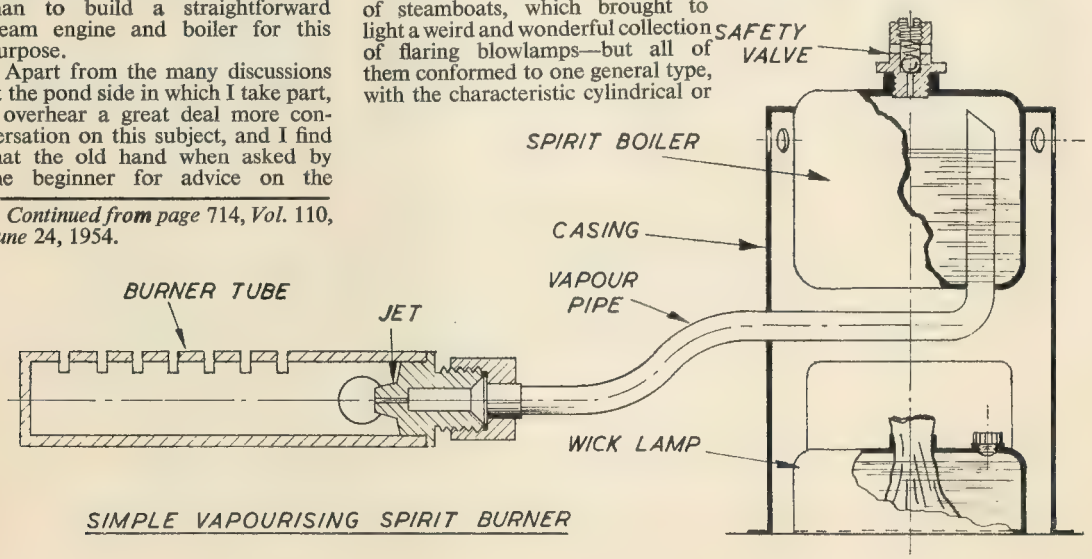
Apart from the many discussions at the pond side in which I take part, I overhear a great deal more conversation on this subject, and I find that the old hand when asked by the beginner for advice on the most suitable type of boiler, will almost invariably recommend the well-tried and trusted " centre-flue." As the poet says, " the grave decisions of the old are always sound, though rarely bold "—and this counsel, albeit at variance with my personal preference for a more adventurous approach to steam plant design, is undeniably a safe road to moderately successful results.

As I have already explained, the most suitable means of firing boilers of this type is by a blowlamp of the torch type, and this also conforms to the requirements of those who do not wish to venture too far on the perilous path of experiment. Even though the efficiency obtainable with this particular combination of boiler and burner may be limited, complete failure is much less likely than with experimental types of potentially higher output. It is interesting to note that in competition work, very few model power boat constructors will have anything to do with any other method of firing than the orthodox petrol or paraffin blowlamp; at an important regatta I attended recently, I noted the steam-raising ceremonies of a galaxy of steamboats, which brought to light a weird and wonderful collection of flaring blowlamps—but all of them conformed to one general type, with the characteristic cylindrical or tapered flame tube, vaporising coil, and pressure tank.

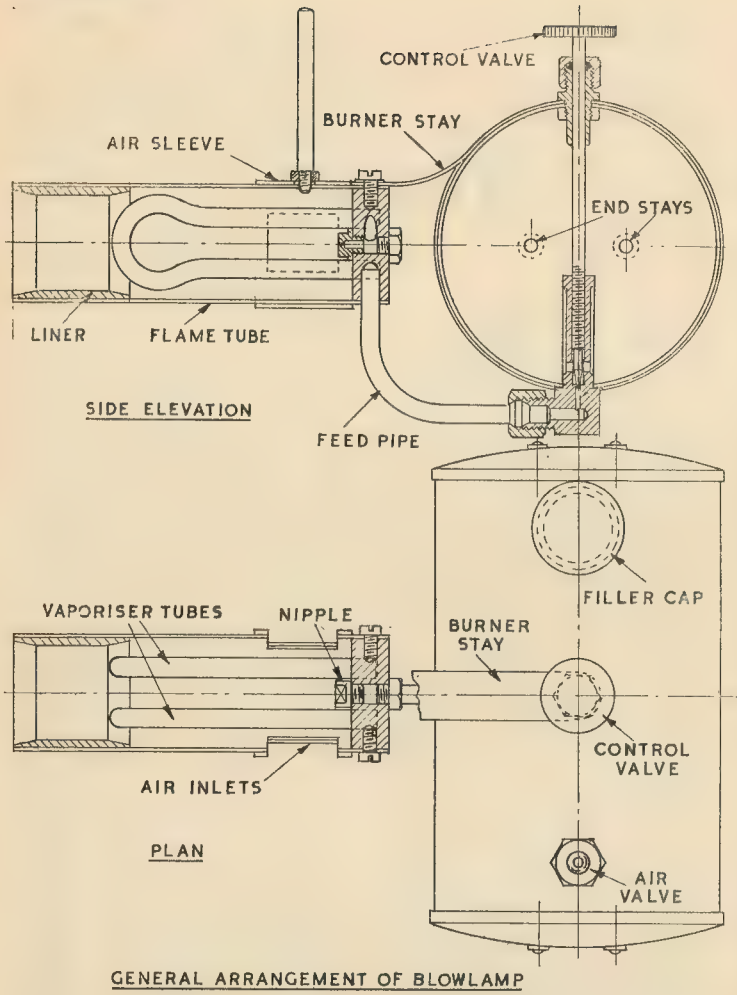
Some beginners, in their quest for the utmost simplicity, express their desire to use methylated spirit fuel, which can certainly be used in the most primitive types of wick lamps, but is rarely found capable of producing any very great degree of heating efficiency. I have seen hundreds of spirit-fired steamboats ambling nonchalantly about in various ponds, and no doubt giving any amount of pleasure to their owners and constructors, but I cannot recall any boat so powered having achieved any success in competition work. Bearing in mind the fact that in prototype craft, prizes are awarded not for speed performance, but for straight steering and consistent, constant-speed running (the former usually embraces the latter in practice), it seems fairly clear that spirit firing is not the ideally simple thing it is often believed to be.

Internal-flue boilers of any kind are quite unsuited to firing by methylated spirit wick lamps, and though it might conceivably be possible to develop a relatively simple form of vaporising spirit burner to work fairly well in the limited confines of a narrow cylindrical flue, I have never seen this done. If, however, any reader should care to try it, a burner based on the principle of the old " French blowpipe," described in the previous articles, would be capable of adaptation in this way, and I give a drawing here of a suitable arrangement. Methylated spirit is, of course, a relatively expensive fuel, but this would not necessarily be a serious

Continued from page 714, *Vol.* 110, *June* 24, 1954.



SIMPLE VAPOURISING SPIRIT BURNER



GENERAL ARRANGEMENT OF BLOWLAMP

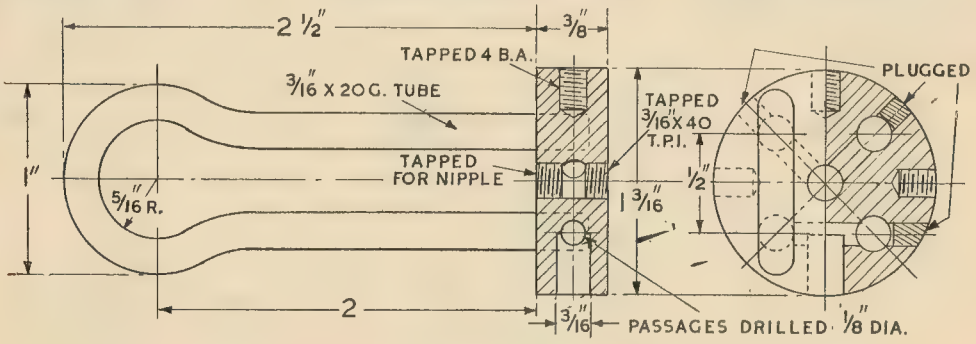
deterrent to its use, if it would produce the desired results, in a small scale steam plant.

A New Blowlamp Design

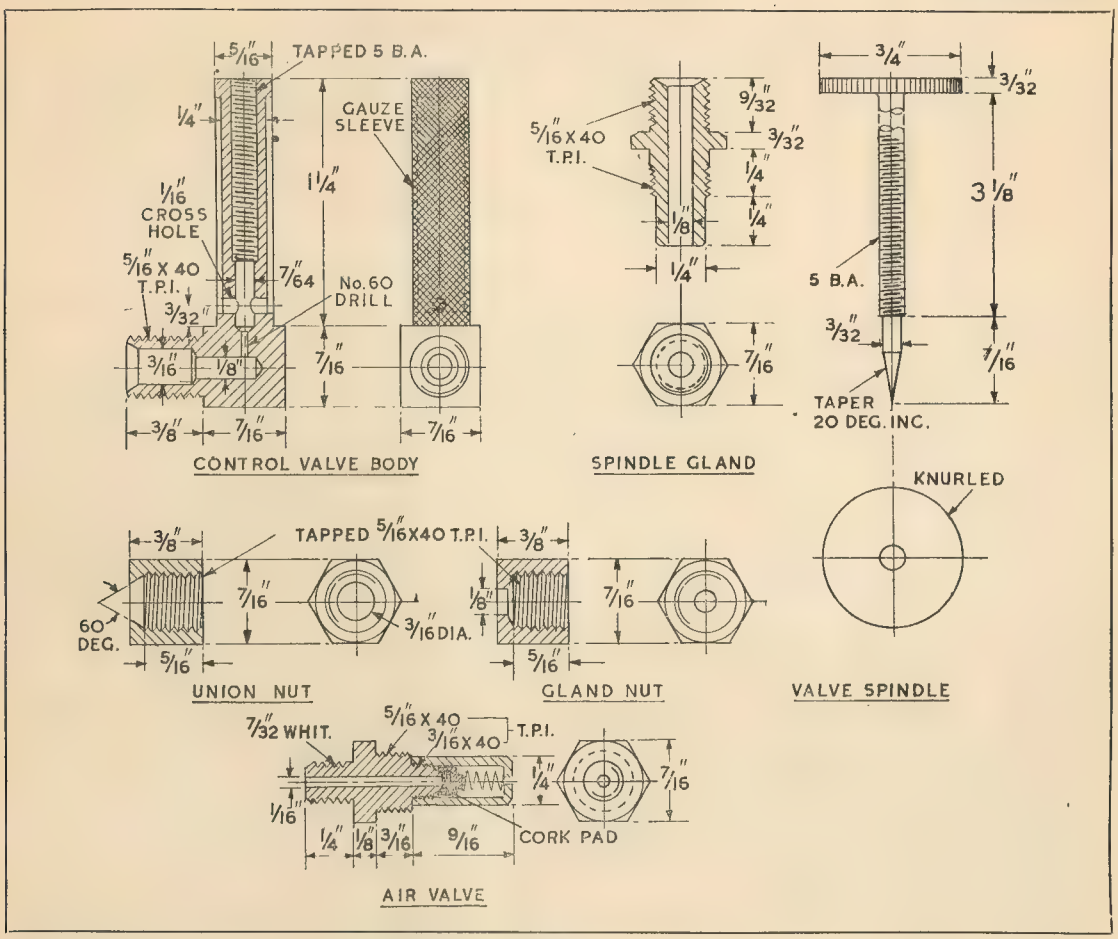
The blowlamp shown in the general arrangement and detail drawings was originally designed for firing the Trident Mark I boiler, and has already been described in *Model Ships and Power Boats*, but in view of the fact that a large proportion of "M.E." readers have not seen this description, I have considered it worth while to repeat it here. While there is nothing very novel or original in the design, it is by no means identical with the type of blowlamp usually employed in model power boats, and it is fairly straightforward in construction, besides being reliable in operation. Several of these blowlamps are in use among the steamboat fraternity, and they have been used with both petrol and paraffin; my own preference is for a 50-50 mixture of the "High-Flash" blowlamp fuel with paraffin or Texas Vaporising Oil (as used in some types of farm tractors). The former fuel, I may mention, is produced by the High Flash Petroleum Co. Ltd., Parson's Mead, West Croydon, Surrey, who are perhaps best known as the makers of "Spitfire" lighter fluid, and also fuels for small i.c. engines.

The drawings show the blowlamp burner fitted to a cylindrical pressure tank, to form a self-contained unit which can be located by spring clips or other convenient means, so as to be removable from the plant for lighting-up or cleaning, but in some cases a fixed position for the burner in the boiler flue may be preferred, with the tank in any convenient, possibly remote, location; and the latter may of course be of any convenient shape and size, subject only to being capable of holding the required pressure; I recommend a test pressure of not less than 50 lb. per square inch. No built-in air pump is shown, as the usual method of fitting the tank with a non-return valve and applying a cycle pump is found quite satisfactory, but this detail is also optional.

The burner embodies a cylindrical flame tube, having an internal liner at the mouth which slightly restricts the bore, and the vaporiser consists of a bronze or copper disc with two "hairpin" elements of $\frac{5}{16}$ in.



VAPORISER ASSEMBLY



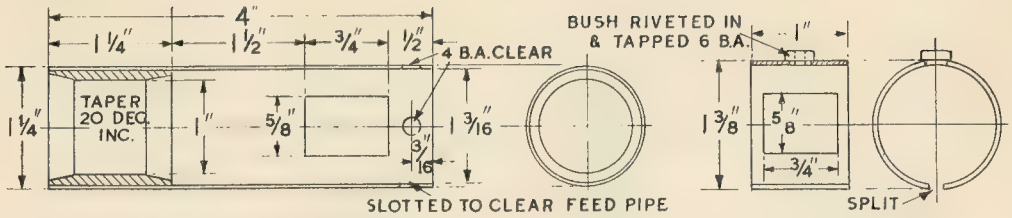
diameter tube, " in parallel," and either a plain or variable jet nipple, the former being recommended for simplicity, as standard nipples of the Primus type are readily available. Some experiment with the size of nipple may be found desirable, especially if different fuels or fuel mixtures are tried out. It is generally found that petrol or other volatile spirit requires a larger jet than paraffin or similar distillates, as it is very important in the latter case that the fuel does not pass through the vaporiser at too high a rate so as to cause imperfect vaporisation, resulting in a smoky yellow flame, or spraying of ignited fuel *a la flammenwerfer*.

Control of the flame is obtainable by means of a screw-down needle valve in the tank, and it is important that the stem of the valve should have an effective packing gland, to avoid possible leakage of air pressure. The head of the valve may be screwed on with a very tight thread, and riveted over, or silver-soldered; the alternative method of bending the spindle end over at right angles is not very sound engineering practice, and may be found a disadvantage if it is required to skim up the point at any time. Bronze, stainless steel or german silver is recommended for this part, as it should definitely be harder than the seating in the body, and resistant to corrosion, as fuels often contain traces of acids which cause rust and pitting of ordinary steel.

The valve body incorporates a sleeve filter of fine gauze, as used in petrol filters of cars and motor cycles, which is soldered in position before the body is fitted to the tank. Soft-soldering is satisfactory for securing this part, also the filler cap and the endplates, but two stays are shown passing through the latter to withstand the endwise pressure. These endplates may be produced quite easily in the lathe by spinning from 20-g. copper or cartridge brass, well annealed before starting operations. If desired, the air valve can be incorporated in the filler cap; details are given of a cork-seated non-return valve with a light bronze spring, but a ready-made standard Primus valve, which is of a similar type, may be adapted by attaching a nozzle screwed 7/32 in. by 24 t.p.i. to fit the cycle pump connection. Other threads in the various components are specified as 40 t.p.i., except in the case of the jet nipple, but for the larger sizes, such as the union and the gland, 32 t.p.i. may be substituted.

Vaporiser Construction

The disc to which the elements are fitted is turned from hard bronze or gunmetal and drilled as shown; note that two radial holes lead into the centre at the top, but the inlet passage, which enters vertically at the bottom, is connected to the elements by a horizontal drilled hole. Do not plug these holes until



FLAME TUBE AIR SLEEVE

assembly is complete, as they can be used for washing out and checking the free passage through the elements. The centre hole is tapped at the front to take the jet nipple, and at the back to take a plug which is removable for cleaning; if no tap is available to fit the nipple, one can either go to the trouble of making one of the required size and pitch, or braze the nipple in. Many years ago, when faced with this problem, I chose the former alternative, and the tap has been worth its weight in gold on innumerable occasions since then.

In the event of fitting a variable jet, a screwed guide incorporating a gland for the adjusting needle will have to be fitted to the back of the disc, and it will of course be impracticable to fit the burner as close to the tank as shown here; plenty of room must be allowed, not only for extending the screwed needle valve, but also for access to it. One practical objection to this adjustment is that it is extremely difficult to ensure perfect concentric alignment of the needle with the jet nipple, and if the vapour spray is deflected sideways, its effect as an injector of air into the flame tube is impaired, with resultant combustion difficulties. Most users of blowlamps in model steam plants find fixed jets entirely satisfactory when once suitable calibration has been arrived at.

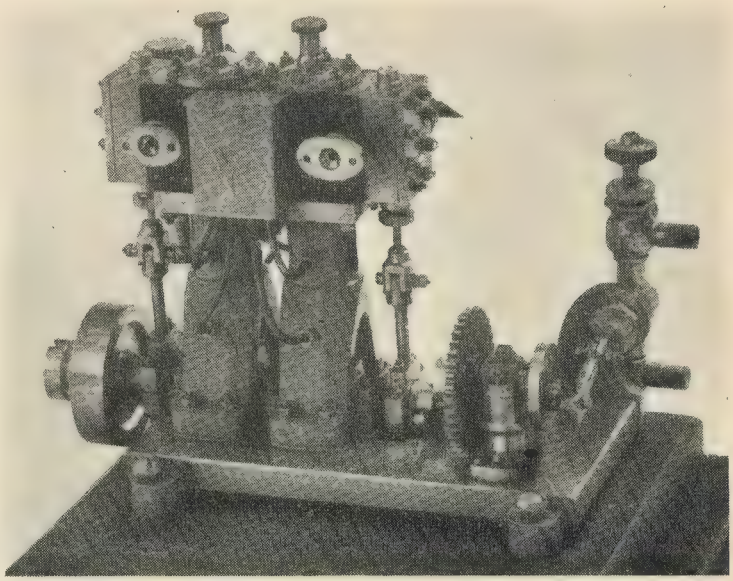
Although ordinary copper tube is not the best possible material for the vaporiser tubes, due to its liability to scaling at high temperature, it is probably the only material which will readily be available to the constructor. Brass is better in this respect, but has a much lower melting-point, and may easily get hot enough to reduce its mechanical strength very considerably. It will be necessary, or at least advisable, to load the tubes with lead or Cerrobend to enable them to be bent to the required radius without kinking.

One reason why ordinary brass should not be used in constructing the vaporiser is that brazing spelter having a fairly high melting point is desirable for brazing the tubes into the disc, and brass will not stand anything of much higher melting-point than silver-solder. After fixing the tubes, a drill should be run into the passages, and paraffin should be pumped through the passages and the tubes, to clear them of swarf and scale, by means of a syringe, before brazing in the plugs.

Some constructors may wish to fit the plugs in such a way that they can be removed to facilitate cleaning, which is certainly very desirable, but not at all easy to carry out in practice, as screwed plugs are difficult to make gas-tight at high temperature. If, however, it is decided to try fitting removable plugs, I suggest that in addition to tapping the holes with a fine thread, they should be countersunk to an included angle of 60 deg. (a centre-drill, carefully used, is suitable, but the horizontal hole should first be faced off with an end mill or facing cutter), and the plugs made with countersunk heads to fit. A smear of oil varnish or enamel will help to make the joint gas-tight.

The liner in the flame tube may with advantage be made of stainless steel for maximum heat resistance, but mild-steel or copper liners have been successfully used; it is fixed in place with three or four screws or rivets. In some cases it may be found advantageous to drill a number of holes about ⅛ in. diameter around the flame tube, immediately behind the liner, as these will influence the heating of the vaporiser tubes to some extent, but results obtained in this way have so far been rather inconclusive. The air sleeve is an optional fitting, as it is not normally found necessary to restrict the air supply; but in any experimental type of burner, it is worth while to provide means of air control, and observe its effects, which may be instructive—or on the other hand, they may not !

(To be continued)



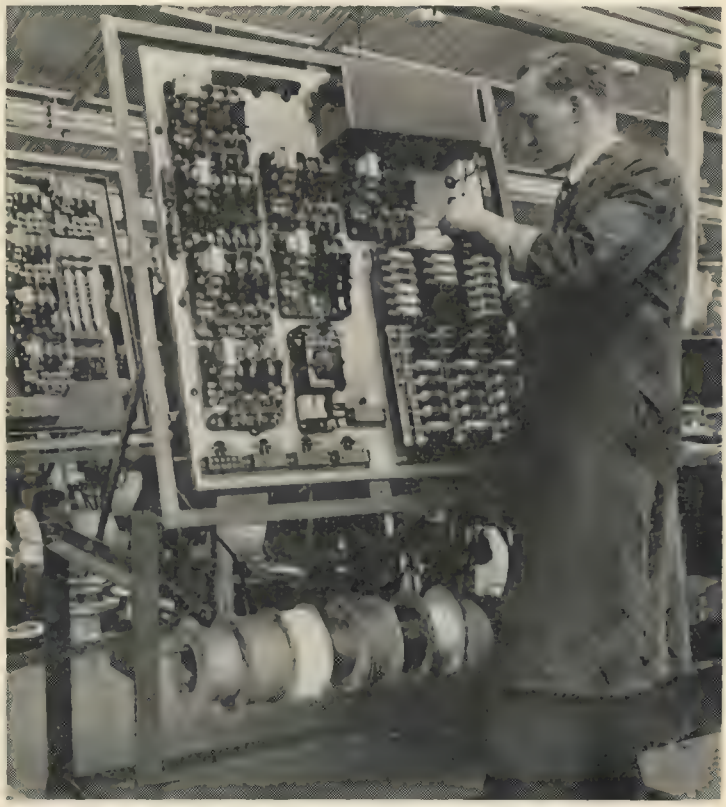
A half-size "Warrior" twin engine (⅜-in. bore × ⅜-in. stroke) built by Mr. W. Callum, of Filey, and seen at the 1953 *"M.E." Exhibition*

Brook Motors' New Factory

One of the winding benches on the Barnsley conveyor lines

EXACTLY 50 years after the manufacture of Brook electric motors was first started in a one-room workshop in Huddersfield, a new factory, claimed to be one of the largest and best-equipped of its kind in the world, has been officially opened at Barugh Green, near Barnsley. The occasion was marked by an impressive opening ceremony at which all the important industries' both in this country and abroad, in which electric power is used, were represented, and Sir John Keeling, chairman of the Yorkshire Woollen and Worsted Federation, pressed a button which set in motion the conveyor system of the factory and sounded the hooter to start work.

Brook Motors have always specialised in the manufacture of alternating current motors, and their constant endeavours to improve the design, reliability and efficiency of these motors have played an important part in the evolution of the modern trouble-free motor which furnishes power, not only for every industry, but also for innumerable amateur workshops. The range of motors now manufactured embraces fractional horse-power single-phase types from $\frac{1}{8}$ h.p. upwards, three-phase industrial motors of the induction and slip-ring types, and switchgear, controls and starters of all kinds. Various types of frames including protected, drip-proof, totally enclosed, pipe-ventilated and flameproof are available in all ranges, also alternative mountings to suit various methods of installation, and ball, roller or self-lubricating sleeve bearings. Built-in units, consisting of finished rotors and stators, which can be incorporated as integral parts of machinery, are also supplied for industrial purposes using three-phase supply. Where very high rotational speeds are required, special motors adapted to run from a.c. mains through frequency changers are available.



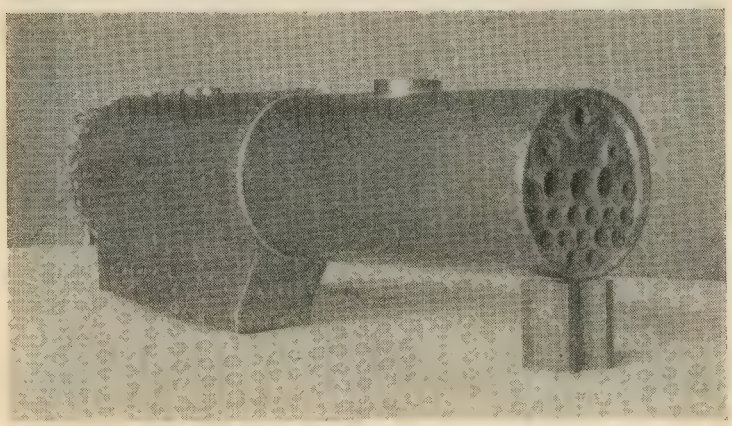
A special control panel being built up from standard units

L.B.S.C.'s Lobby Chat

IT'S A LONG WAY!

SOME months ago, there appeared in a London evening newspaper, a short article in which it was stated that it was intended to make a nonstop run of 100 miles on a small railway in Sussex, which was then nearing completion. The newspaper reporter, as usual, knew absolutely nothing about the technical aspect, and just set down what he was told, with the usual journalistic embellishments. Quite a number of our own readers saw this, and wrote to me for comment; some of them enclosed cuttings, and asked if I thought it were possible. As I happened to know the persons concerned, I made no comment in these notes at the time, for obvious reasons; neither did I comment when an announcement was made in our Editorial column—which, incidentally, was a somewhat different one to that made in the newspaper! Well, at the time of writing, the "great day" is now past, and events panned out exactly as I anticipated; so it will do no harm if the matter is made a subject for a little cold analysis.

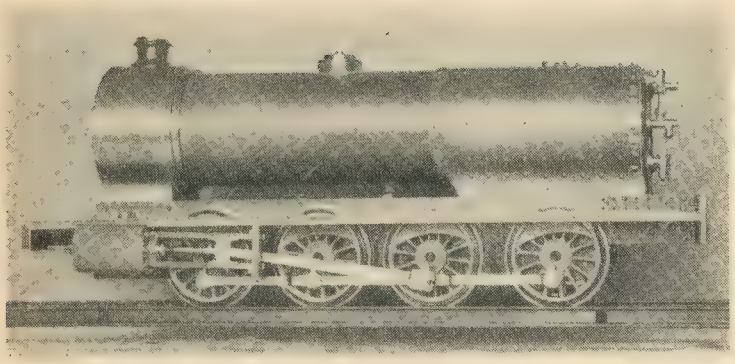
In days gone by, a nonstop run of 100 miles was considered something to make a song-and-dance about, *in full-size practice.* Even at the present time, nonstop runs of that distance, or a little more, are still far from plentiful. It is not long since the London-Birmingham nonstops were resumed; and it is certainly no easy job for a full-sized engine, and its driver and fireman, as our footplate readers will readily confirm, to make a nonstop run between those two cities. In London and North Western days, the crews on the Birmingham nonstops only made four trips for a week's work. On the L.B. & S.C.R. our longest nonstops on the regular schedules were between London and Brighton, or Lewes (on the Eastbourne and Hastings expresses) a little over 50 miles each way; though occasionally we ran nonstop from London Bridge or Victoria to Fratton, 86 miles, with holiday-time excursion trips to Portsmouth for the Isle of Wight. My gasoline buggy is one of the easiest things in the world to drive; in fact it is a standing joke among two or three of my few intimate friends, that it drives itself, and if I dropped off to sleep as I was turning out of this street, it wouldn't matter, I'd wake up and find myself safely at my destination. Anyway, one of my favourite evening runs, is through beautiful Surrey and Sussex, over the South Downs, to Newhaven, thence along the cliff road overlooking the sea, to Brighton, and home from there, through the byways, passing close to my dearly-loved Ouse Viaduct, over the top of which I have been more times than I care to remember, and which gave me one of the biggest scares I ever remember in all my life.



The "Q 10" type boiler—Note tube arrangement

Johnny Barlow "following in father's footsteps"

I was a young fireman then, not long passed; and that night, owing to the sudden illness of the fireman of the Newhaven boat train, I was called for the job at a few minutes' notice. The engine was a *Gladstone* (195 *Cardew*) and she was just a piece of cake to "keep hot." It was a fine clear night; and hopping along at a tidy clip, well up to time, we reached the north end of the viaduct just as another train coming in the opposite direction, passed the south end. The firehole door of the other engine was open, and the glare from it lit up the cloud of exhaust steam billowing back over her train. It was an impressive sight—and then poor Curly's heart stood still! I had the awful feeling that we were going to hit her, head-on, in the middle of the viaduct, and the wreck of the two trains would be hurled into the valley below. Of course, she dashed by us in perfect safety on the up line, and I felt an awful fool; but those few seconds seemed like an eternity. My mate, a fatherly old boy nearing retirement age, told me afterwards that he himself, and many others, had had similar scares on their first main line trip. You *know* you're all right, but—well, it's just Nature asserting herself—nuff sed. Getting back to the car trip, the "clock" usually turns the 100 miles, a few yards from our hacienda; and am I glad to get off the seat and



Mr. P. T. Atkinson's anticipation of "Netta"

stretch my legs, although the seat is very comfortable, and the back rest suits my body perfectly.

A Different Aspect!

I can quite understand the feeling of anybody standing by, and surveying a little line, and thinking to himself: "Oh, it's easy enough to keep on running around that, until I've done a hundred miles." Just merely a matter of sitting on the car, shovelling a bit of coal into the firebox, and operating the pump and injector. But wait a minute! Suppose the same person to be at Paddington, and instead of the line being continuous, and all (or most of it) in sight, it stretches away into the distance, through Slough, Reading, Didcot, Swindon, Chippenham, to Bath, alongside the Great Western main line. Beside him, on the 4 ft. 8½ in. gauge rails, stands a class "7" Pacific, maybe *Apollo*, or *Lightning*, or another sister of the same family, with a long train, headed in the same direction. "Where are you going?" says he, to the driver. "Bristol, first stop Bath," says the G.W.R. driver, "and where do you reckon you're going, with that little tea-kettle?" "Oh," says our would-be record-breaker, "I'm going to run 100 miles nonstop." The G.W.R. driver opens his eyes wide. "You are, are you?" says he. "Well, take it from me, it's no picnic with an engine this size, and if you get as far as Ealing before you're clinkered up, you'll be darned lucky. Anyway, you'll be needing a soft cushion before that, even if you don't have to stop for some other cause!" At that moment, the G.W.R. guard gives the right-away, and as the driver of the class "7" toots the whistle and pulls open his regulator, he calls down "Come on, matey—I'll race you to the other end of Box Tunnel, that's about 100 miles!"

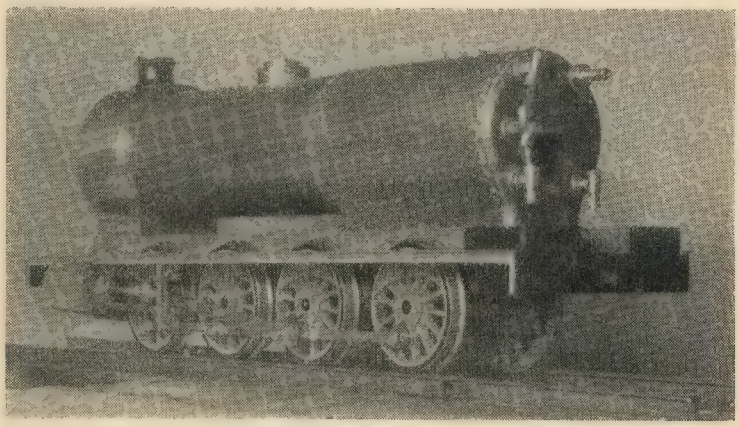
Dear reader, can *you* imagine anybody sitting on a little flat car, and driving a 5-in. gauge locomotive from Paddington to the other end of Box Tunnel, without a stop? The person who can do that, isn't yet born, and never will be, while human beings are constructed in the usual manner, and have to conform to the rules of Nature.

Other Factors

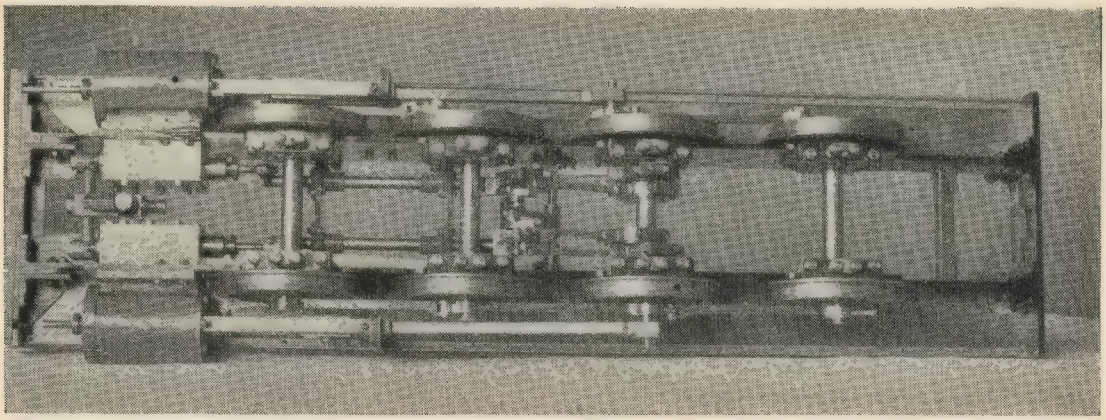
Knowing the construction and capabilities of the average 5-in. gauge locomotives in general, and the two would-be record-breakers in particular, I wasn't in the least surprised at the results. Everybody is entitled to his—or her—opinion; and my own opinion, is that a locomotive running on a 5-in. gauge track, which fails from choked tubes or a clinkered grate, in a matter of five miles or so, when hauling such a featherweight load as a single passenger, isn't exactly a shining example of efficiency. But putting that aside, there is the little matter of adequate lubrication. Small cylinders require far more oil, in proportion to size, than their full-sized sisters; and unless some means of replenishing the lubricator when running, is furnished, then there would soon be trouble with scored pistons and valves. Same applies to the moving parts. On the locomotive which *did* put up a good mileage, a friend tells me that oil was literally squirted at it as it slowed down, when drivers were changing over. Whilst this is akin to a cyclist riding beside a marathon runner, and supplying him with food and drink, it can hardly be classed as a fair thing to do; but I would raise no objection to by-standers handing bags of coal and cans of water, to anybody trying to make a long nonstop run, because full-size locomotives take supplies of water "on the fly," from the track troughs, and with an efficient locomotive, enough coal could be carried on a car behind the driver, for a lengthy trip. Handing it to him as he passes would, therefore, only be a matter of convenience.

How the Job Could be Done

Leaving out the human element, I think it *would* be possible for a little engine to make a nonstop run of 100 miles, if it were to be specially prepared. I believe that my 3½-in. gauge Webb compound *Jeanie Deans* would do it, for the following reasons. Due to the inaudible blast when running with a single passenger, she doesn't foul the tubes in the slightest, and puts nothing in the smokebox. I haven't opened the smokebox door for months; and last time I took a look, the only residue in the smokebox was a teaspoonful of charcoal ash, from lighting up, and the tubes were perfectly clean. As



The "Q 10" boiler erected



Pit view of "the works"

she will easily run two miles or more on one firing, and a tenderful of water lasts about an hour, one extra car could easily carry all the extra coal and water required. The fire never clinkers, and there is very little ash; but it wouldn't take me long to alter the grate to the rocking-bar pattern, and fit a sliding trap to the bottom of the ashpan, which could both be worked from the footplate. I could also fit a temporary oil supply to the cylinder lubricator, and a small tank with pipe feeds for the axleboxes and other points needing oil. Given a continuous supply of coal, water, and oil, she could be kept running, not for 100 miles only, but until she was completely worn out ! !

Discomfort

The locomotive could thus be made to do the trick; but not so the driver. The calls of Nature cannot be ignored, and one can't keep on keeping on, without refreshment of some sort. I'm used to sitting on a little flat car; goodness only knows how many actual miles I have driven little engines, but after awhile, even on a cushion, there is a lot of discomfort. One Christmas Day, during the war, when Jerry let us have our dinner in peace, I snatched the opportunity to do some injector testing, and had old *Ayesha* in steam from about 9.30 a.m. till dusk. She ran over five miles, stopping to change injectors, and for dinner, without any choked tubes, or clinkered grate; but by the time I shut down, I felt like a woman who had just had her first lesson in horse-riding. When I went to bed, I had a bad attack of cramp in both thighs. You can't play tricks with Nature, and get away with it !

So much for that; now let's have a few words about this weeks' picture gallery, part of which should be interesting to the many good folk who are building *Netta*.

"Netta" Anticipated

Some years ago, Mr. P. T. Atkinson, then living in the North of England, sent me an outline drawing, and some details, of a proposed North Eastern T-class locomotive that he was intending to build in 3½-in. gauge. He later removed to Scotland, but continued with the job, and a few weeks ago, forwarded the reproduced photographs, showing progress to date. The locomotive, naturally, isn't the same in many details, as the ones I am describing in the *Netta* serial; but a study of the photographs may be of assistance to those good folk who have never seen the acutal engines, or even a picture of one. Friend Atkinson is fitting a larger boiler than I shall specify, as some of the class were rebuilt with Hull-and-Barnsley type Q 10 boilers, which were bigger than the original T type, and entailed modifications in the boiler mountings, and the cab. He also uses a valve gear with launch links, and no valve crossheads. The pump is dispensed with, reliance being placed on the injector only; and any builder who can drill the injector cones, and ream the tapers, could do worse than follow suit. There are less pipes to connect up, between engine and tender, and less "plumbing" on both engine and tender.

The boiler shell, which is $4\frac{3}{16}$ in. diameter and 13-gauge, is made from a piece of copper tube which came from a disused chemical plant, and was lagged with asbestos containing a diamond mesh, which slightly corroded the copper and caused the markings shown. The brazing, and some of the plate flanging, was done by a friend, Harry Swaine, of Sunderland, a full-size boilersmith. The chassis is now practically complete, and the "works'" have been tested under steam; and by the way they operated, *Bettanetta* promises to be a very lively lass.

Honours Easy !

With the majority of firms publishing technical books and periodicals, the technical and commercial sides are "as the poles apart," the latter's concern being confined to £ s. d. Not so in the case of "our" firm ! Our genial advertising manager fancies his luck as an engine-driver, and isn't afraid of "advertising" it; and our managing editor can also do a bit in the locomotive-managing line, too, with the result that there has been friendly rivalry between them, as to which was the better driver. To decide matters, they arranged a friendly driving contest on my road, and it took place on a recent fine afternoon. The engine I selected was a 2½-in. gauge 2-8-2, which needed a certain amount of skill to operate perfectly, much more so than a bigger engine.

The contest lasted a couple of hours or so, each "combatant" taking a spell at the throttle, while your humble servant "watched points." There was a lot of good-natured banter about exceeding the limit around the curves, and so on, but our friends finished up "honours easy"; each drove in an exemplary fashion, kept up steam and water, and never came off the road, so I finally declared it a tie, and we all adjourned for a cup of the engine-men's best friend, sandwiches, cakes, and a chinwag. There's *real* enthusiasm for you—and if world problems could only be settled by similar means (they *could*, if the will were there) what a grand place this old world of ours would soon become !

READERS' LETTERS

PRECISION GROUND STEEL

DEAR SIR,—I am following with interest the letters on the above subject, but I cannot agree with all Mr. Gregory says in his letter (THE MODEL ENGINEER, May 20th, 1954), and I suggest that the manufacturers do *not* "take every precaution to see that the material is not dispatched in this state," and that, if each bar was to be tested with a "GO" and "NO GO" ring-type gauge the fault would be detected immediately.

Having always been led to believe that work is precision ground in order to render it to a degree of circular truth far greater than that which can be obtained by a turning operation in a centre lathe, and within agreed close limits on any given nominal diameter, I feel that it is hardly fair to state that the limits are + or − 0.00025 in. and to turn out lobular work with the lobes right on the high limit and the depressions right on the low limit; it is also cold comfort to be told that you can have your precision ground silver-steel precision ground if you order it especially.

With reference to the question of the glass-hard ends, I feel, and I think I can safely say that I shall voice the opinion of a large number of users, that, in consideration of the high price paid for this material, it should be possible to purchase it and to use it without further treatment by way of pots of molten lead, to anneal these ends.

In conclusion, I must say that I am in complete agreement with all Mr. Hughes says, and I think that the term "precision ground" when applied to the centreless grinding of silver-steel is misleading. Who, in the absence of knowledge to the contrary, would question the circular FORM of material said to be precision ground? A few years ago I made six special machines each containing a shaft to run at 1,000 r.p.m. For these shafts, which were $\frac{3}{4}$ in. diameter, to "make a good job of it," I used $\frac{3}{4}$ in. precision ground silver-steel running in the best quality phosphor bronze bearings. Much to my surprise (at the time) the bearings wore with extreme rapidity, and satisfaction was only obtained by replacing each machine with ball-bearings. Of course, it is now obvious that the lobes on the silver-steel were acting like a blunt reamer, and instead of using the best material for a shaft I was using the worst possible. Over to you, Mr. Gregory!

Yours faithfully,
St. Leonards-on-Sea. K. C. HART.

Letters of general interest on all subjects relating to model engineering are welcomed. A nom-de-plume may be used, but the name and address of the sender must accompany the letter. The Managing Editor does not accept responsibility for the views expressed by correspondents.

TIME AND MOTION STUDY

DEAR SIR,—For the past two years I have employed the methods of Mr. W. G. Small, and I can fully substantiate his claims for higher production.

On the debit side, however, must be placed the time spent in process planning each detail in advance, so that similar operations may be grouped together. I have found that this is justified by the overall increase in output.

Yours faithfully,
Shoreham. GEORGE MARDEN.

A TRIBUTE TO THE "M.E."

DEAR SIR,—I wish to tender my deep and sincere thanks to you all for the assistance which THE MODEL ENGINEER has given me—but let me tell you the complete story.

After three and a half years in the Fleet Air Arm, I had a job to settle down, and finally secured employment on London Transport as a bus driver. With this security, I married and bought my own house.

In 1949 the "bug bit," and I had to have a lathe of my own. I duly bought a Grayson $3\frac{1}{2}$-in. lathe and started to build up a workshop. That was five years ago, now I have just about all I could desire.

From the start I took work in. This was possible, as my employment was shift work. All my profits I ploughed back into the workshop, and I was gaining experience all the time.

Last Christmas, I risked leaving a secure job and obtained employment with an engineering firm. My work there covers all aspects of the trade; turning, milling, shaping, planing and fitting. It is not surprising that I refer many times to THE MODEL ENGINEER, and I am still learning.

Inspired by my early efforts at home I have now only one desire, and that is to start on my own. This will be possible as soon as I have a little more capital and decide to take the plunge. If ever I do, it will only be due to the help you have given me through the pages of THE MODEL ENGINEER. Once again I tender my thanks for all your help and guidance.

Yours faithfully,
Hayes, Middx. W. K. WALSOME.

UNUSUAL POWER UNIT

DEAR SIR,—Passing through a Liverpool park recently, I noticed a fair complete with "high-flyer" (steam swing boat) which drew my attention, the power unit being unusual. This consisted of a Burrell traction engine altered to suit the job, a single-crank compound No. 3356 which soon had the boat at full-swing in a matter of seconds, with the push of two cylinders. This is certainly better than seeing them go for scrap!

Yours faithfully,
Roby, Lancs. A. EDWARDS.

Next Week . . .

A VETERAN'S WORK
Model engineering is a hobby that tends to keep us all young, and a remarkable instance of the truth of this is the story of an enthusiast who is now over eighty years of age and has been making models since he was in his teens.

"NETTA"
Like all ordinary locomotives, this one requires slide-bars, crossheads, guide-yokes etc.; in one complete instalment of the serial, all such details are dealt with.

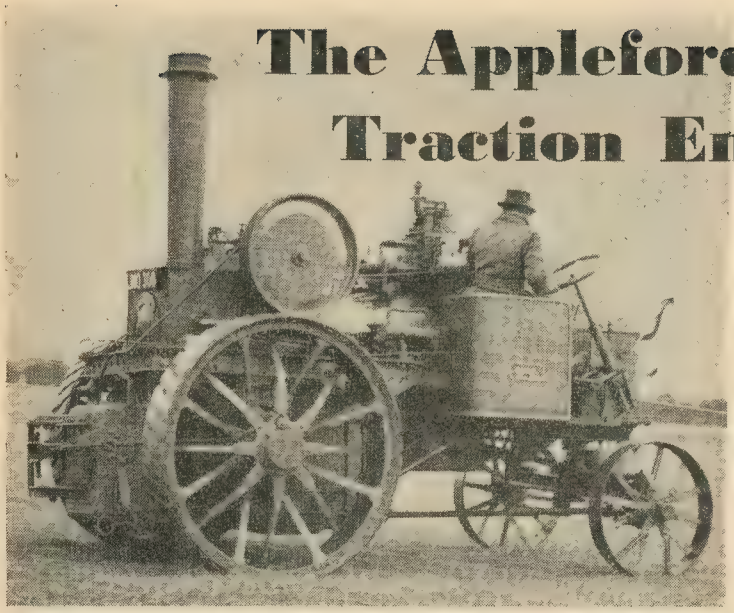
RECENT REGATTAS
"Meridan" gives an interesting report illustrated with photographs, of model power boat meetings at Forest Gate and Bournville.

MORE ABOUT THE "BUMBLE BEE"
Further machining operations on the components for this versatile little stationary two-stroke are described by its designer.

INEXPENSIVE ELECTRIC MOTORS
The conversion of an ex-service rotary transformer into a motor capable of useful service for many purposes in the home and workshop is described by "Duplex."

"GUINEA-PIG" MODELS
Industrial and scientific research with the aid of experimental models is exemplified by the models of bridges and other structures built and tested at the National Physical Laboratory.

The Appleford Traction Engine Rally



A well-preserved specimen of the "Suffolk Punch," owned by Mr. G. Romanes, of Bray, Berks

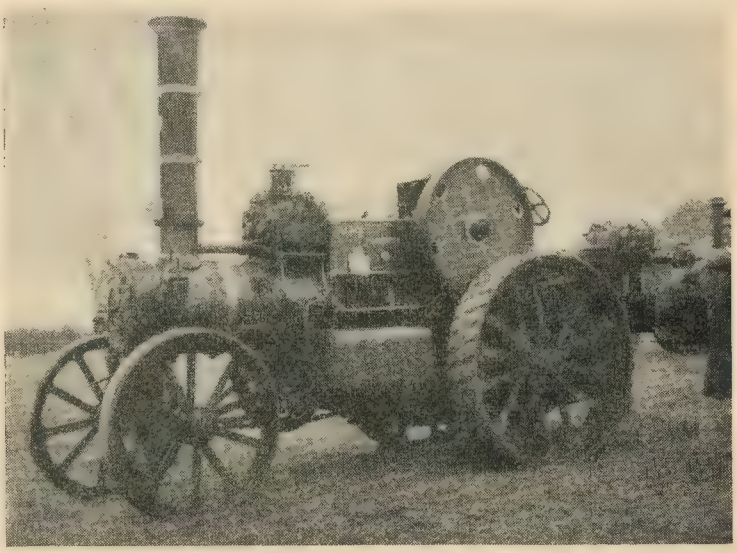
THE controlling genuis responsible for our English weather must have been in a particularly fractious frame of mind when deciding what kind of weather should be provided for the Traction Engine Rally at Appleford, Berks, on June 12th. Conditions could scarcely have been worse, for the time of year ; yet the glowering skies, frequent downpours of heavy rain and the persistent chilly north east wind were not enough to damp the enthusiasm of the 6,700 people who attended the event, or to make it impossible to carry out the programme.

The National Traction Engine and Traction Association (Inc.) is to be congratulated upon the support it received as well as upon the attractions it had provided. There were 23 entrants on the list of engines, steam wagons, cars, etc., and all but three arrived on the field. Seven experts had been appointed as a panel of judges whose job it was to judge the various entrants and the items on the programme. What had been, earlier in the day, a fine grass field had become something like a quagmire by the time the races were due to begin ; yet only two items, a flat race for smooth-tyred vehicles and a tug-o'-war between two steam wagons, had to be abandoned. The use of spuds on the traction engines made it possible for the other events to be carried out as planned, even if no record times were noted.

The prize in the "Elegance" contest was won by a vehicle which, although it was built as long ago as 1897, is in first-class order, visually as well as mechanically. It is a Soame Steam Cart, entirely home-made and, in spite of its age, as novel, as interesting and as spruce as it was when first completed. It is powered by a 2-cylinder compound engine steamed by a vertical boiler, both of which are mounted at the back of the cart. The h.p. and l.p. cylinders are set horizontally, one each side of the boiler, on a bedplate on the floor, and the transmission is by belt from the crankshaft to the rear axle.

It was Mr. Arthur Napper who, with his Marshall Agricultural Engine, *Old Timer*, built in 1902, carried off most of the honours in the obstacle races. The prize for the best performance by a newcomer was won by Mr. F. G. Upton, of Braywick, Berks, on *Eileen*, the Wallis & Steevens tractor formerly owned by Mr. G. Romanes. The Malden & District S.M.E. had three model traction engines in steam.

It is worth putting on record that two of the newcomers this year had come a long way ; one was a Sentinel wagon owned by Edward Burton & Co. Ltd., of Ferring, Essex, and the other was a 1912 Burrell engine belonging to Mr. W. M. Salmon of Llandrindod Wells, North Wales. A very close runner-up was a 1900 Burrell entered by S. A. Smith of Cressing, Essex. If we add to this that one of the judges was Mr. Ronald H. Clarke from Norwich, there can be no doubt as to the attraction of the rally.



A 1919 Garrett tractor still going strong; owned by Mr. R. Greenaway of Henley

At top left is a view of the most attractive Soame Steam Cart; top right, a Foden steam tractor, beautifully kept by Barnett & Howell, of Andover; on the right, a brilliantly painted Burrell Scenic showman's locomotive owned by S. J. Wharton, of Minster Lovell; bottom right, Mr. Arthur Napper's Burrell showman's tractor, and bottom left, a damp but earnest panel of judges at work.

QUERIES AND REPLIES

"THE M.E." FREE ADVICE SERVICE. Queries from readers on matters connected with model engineering are replied to by post as promptly as possible. If considered of general interest the query and reply may also be published on this page. The following rules must, however, be complied with:

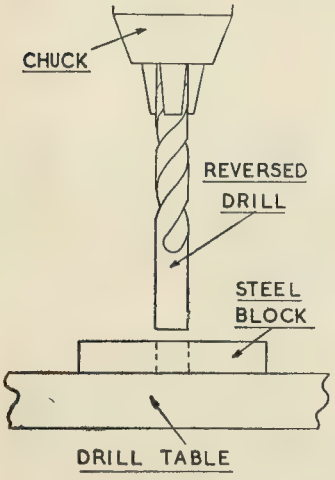
(1) Queries must be of a practical nature on subjects within the scope of this journal.
(2) Only queries which admit of a reasonably brief reply can be dealt with.
(3) Queries should not be sent under the same cover as any other communication.
(4) Queries involving the buying, selling, or valuation of models or equipment, or hypothetical queries such as examination questions, cannot be answered.
(5) A stamped addressed envelope must accompany each query.
(6) Envelopes must be marked "Query" and be addressed to THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

Holes in Thin Sheet Metal

Can you tell me please, how I may put a number of closely spaced holes, ¼ in. in diameter. through a sheet of No. 28 gauge tin plate. I have tried drilling these, but the holes are becoming out of round, and the edges are tearing badly. I have also tried a hammer and hollow punch, but the holes are almost as bad as those which I drilled.

A.M. (Gravesend).

It is extremely difficult to drill clean holes through thin sheet metal by ordinary methods, but it is possible to do so by clamping the



sheet between two pieces of thicker metal, and drilling through the whole assembly together.

In your case, however, we feel that the following method would be simpler and more satisfactory. Clamp an odd piece of flat mild-steel, at least ¼ in. in thickness, to the drilling table of your drill. Now drill a ¼ in. hole through this, and leave the piece of metal still attached to the drilling table. The ¼ drill should now be removed from the chuck, the shank-end ground off square, and reinserted into the chuck with the shank end downwards, i.e., with the chuck gripping the fluted portion of the drill. We have now, in effect, a punch and die accurately located, and clean holes may be punched through the sheet metal; using a sharp downward movement of the drill quill. The drill is, of course, not revolving (see sketch).

By this system, holes up to about ½ in. in diameter may be obtained. The method is also extremely useful for making clean holes through such things as cardboard, and in paper gaskets.

Shrink Fit

I am in process of motorising a hand shaper, and my design calls for a rather hefty overhung crankshaft, to provide movement for the ram. This crank will be under considerable strain, and I am proposing to attach it to the shaft by means of a shrink fit. Will you please let me know if, in your opinion, a shrink fit will be sufficiently strong, and what allowance I should make for shrinkage on a shaft of 1.250 in. diameter?

W.T.M. (Nuneaton).

Provided that the crank is of ample proportions, a shrink fit will certainly be adequate for your purpose, as this type of fit is one of the strongest possible. Parts which have been shrunk together can usually be removed only by cutting or turning-off the part completely. The strength, however, depends largely on the bulk of metal surrounding the hole in the enclosing member. If the crank is too light, the metal may be stretched as it contracts, thus weakening the joint. Allowances for shrink fits are usually calculated at about 0.001 in. per in. of diameter, but may be greater for diameters of around 1 in. or less—say about 0.0015 in.

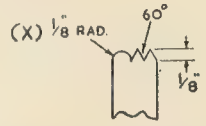
It would appear to us that your problem is not really one which calls for shrink fitting, and the attachment of the crank to the shaft might possibly be better done by means of a stout key, or mating tapers.

Form Tool of Complicated Shape

I wish to make a form tool, for use on the lathe, to the shape shown in the accompanying sketch. The exact radius of the portion marked (X) is not important, but I wish the "vees" to be clean and sharply pointed. My difficulty is that I do not see how I am to grind these "vees" on an ordinary bench grinder, which is all the grinding equipment that I have. Your help and suggestions would be much appreciated.

C.S. (Guildford).

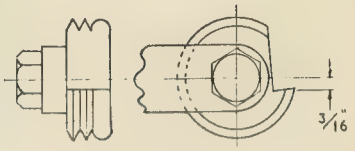
Form tools of complicated shape, such as you require, cannot be ground accurately on an ordinary bench grinder, and would, indeed, present difficulties on almost any type of grinding equipment, if the ordinary flat type of tool is required. These forms may, however, be made fairly easily if a circular type of form tool is used. By this method, the form is turned on the edge of a circular blank of tool steel, in the manner shown in our sketch, the



accuracy of the form depending entirely on the skill of the turner.

For the dimensions you require, the blank should be about 1½ in. in diameter, and it may be of soft high-speed steel, high-carbon steel, or even of silver-steel, which is, of course, hardened afterwards.

A portion is then ground away, as shown, to provide a cutting edge. In order to obtain sufficient periphery clearance, the cutting face is off-set



below the centre of the tool. For a blank of 1½ in. in diameter this amount should be about 3/16 in. A top rake of about 10 deg. should be used for working on steel, but no top rake is desirable for operation on brass. The tool should be secured to a steel shank with a sturdy bolt.

WITH THE CLUBS

The Society of M. & E.E.

Mr. Webster finds himself unable, at present, to give us his promised talk on his "Dean" locomotive. In its place, there will be a rummage sale at 28, Wanless Road, S.E.24, on July 27th. Lots should be entered by 2.30 p.m.

On Sunday, July 18th, the society will visit the Beech Hurst track of the Sussex Miniature Locomotive Society, by their kind invitation. The track is near Haywards Heath on the Cuckfield Road, near the Sergison Arms, and is situated in beautiful rural surroundings; parking facilities are available.

Hon. Secretary: E. C. YALDEN, M.C., 31, Longdon Wood, Keston, Kent.

Ramsgate & District Model Club

The Ramsgate Model Club's 1954 exhibition will be held this year at the club headquarters, at Princes Street, off Queen Street, Ramsgate, from August 16th to 21st inclusive. It will be open from 3 p.m. to 9 p.m. daily except on the Saturday when it will be open from 10.30 a.m. It is hoped that all modellers and those who are interested in models will come and see this special show.

New members recently enrolled have come from Sandwich, Broadstairs and Herne Bay, showing how this Club is becoming a hub for modellers in the district. It is encouraging to see this influx of new blood, as new members bring new ideas.

Many holidaymakers, members of other clubs, make a regular annual visit to the club, and there is always a very warm welcome for all model makers to visit the club any Wednesday or Friday between 7 and 9 p.m.

Hon. Secretary: E. CHURCH, 14, St. Mildred's Avenue, Ramsgate, Kent.

Exeter & District M.E.S.

A most interesting trip, for a coachload of our members and friends, occurred on June 13th, when we paid a visit to the East Yelland Power Plant of the British Electricity Authority and were shown over by Mr. D. MacLeod, power station superintendent, a member of our society, and some of his staff. The weather being fine, we all thoroughly enjoyed our day and returned in the evening via Bideford and Torrington.

Progress on our "O" gauge layout is proceeding and there is still a good bit to be completed. The working parties are still in need of additional help in many ways. New members very welcome any Wednesday or Saturday evening. Come and see us in action at our headquarters, corner of Haldon Road, Exeter.

Hon. Secretary: L. M. R. HISCOCKS, 5, Prince Charles' Road, Exeter. Tel.: Exeter 58811.

Croydon S.M.E.

While we have nothing spectacular to report, the club continues happily and is engaged with a number of track runs during the summer. Meetings continue weekly at 1, Duppas Hill Road, Croydon, and anyone interested is invited to come along.

Hon. Secretary: E. R. VAN COOTEN, 29, Kingsdown Avenue, South Croydon, Surrey.

Victoria Model Steamboat Club

At the club's Jubilee Regatta to be held at Victoria Park, Hackney, on July 25th, the events will be run as follows:—Nomination, first runs of all hydroplanes "C," "C" rest, "B" & "A"; steering; second run of hydroplanes in the same order; team relay. There will be a special prize in both nomination and steering for the highest placed junior.

As this programme is a long one, it is essential that a start is made at 11 o'clock and we would ask all entrants to be ready to start on time.

For round-the-pole events, competitors may nominate up to 5½ laps start, but a run will be counted after half a lap has been completed.

It is proposed to present jubilee mementos at prize-giving time to all entrants, so competitors should all hang on. Should travelling make this impossible, please contact the hon. secretary before leaving.

Hon. Secretary: E. E. WOODLEY, 51, Sittingbourne Avenue, Enfield Middx.

J.N.M. recently enjoyed a lovely afternoon at the Tonbridge Model Engineering Society's track, and is seen here at speed with Mr. J. P. Mercer's "Hielan' Schoolgirl," so called because she was started as a "Schools"-class engine, but was lengthened under the inspiration of the "Hielan' Lassie" articles. She is certainly a real flyer.

THE MODEL ENGINEER DIARY

July 10th and 11th.—International Radio Controlled Models Society. Annual Contests for radio controlled models, to be held in Birmingham.—Model Boats on July 10th, and Model Aircraft on July 11th.

July 11th.—Southend Model Power Boat Club.—Regatta at Southchurch Park, Southend-on-Sea.

August 8th-13th inclusive.—Hastings & District Model Engineers Society.—Exhibition in the Lower Hall, White Rock Pavilion, Hastings. Open from 10 a.m. to 9 p.m. daily except 8th, 3 p.m. to 9 p.m.

August 11th, 12th, 13th, 14th.—Exmouth & District Society of Model and Experimental Engineers.—Exhibition at the Y.M.C.A. Hall, Victoria Road, Exmouth. Opening day from 7.30 p.m. to 9-0 p.m.; other days from 10-0 a.m. to 9-0 p.m.

August 16th, 17th, 18th, 19th, 20th, 21st.—Ramsgate & District Model Club.—Exhibition at Club headquarters, Princes Street, off Queen Street, Ramsgate. Open from 3-0 p.m. to 9-0 p.m. daily, except on Saturday, when the opening time will be 10-30 a.m.

August 18th, 19th, 20th, 21st.—Weymouth & District Model Engineering Society.—Model Railways and Engineering Exhibition, at the Melcombe Regis Boys School, Weymouth. Open from 11 a.m. to 9 p.m.

August 18th, 19th, 20th, 21st, 23rd, 24th, 25th, 26th, 27th and 28th. The Model Engineer Exhibition. in the New Horticultural Hall, Grecoat Street, Westminster, S.W.1. Open from 11 a.m. to 9 p.m.

August 23rd to September 4th.—Exeter and District Model Engineers' Society.—Exhibition at the Friernhay Hall, Exeter.

August 31st to September 5th.—The Brighouse Society of Model and Experimental Engineers.—Exhibition at the Drill Hall" Prescott Street, Halifax.

CORRESPONDENCE

The Managing Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Correspondence and manuscripts should not be addressed to individuals, but to the Managing Editor, THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

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CLASSIFIED ADVERTISEMENTS

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"Impetus" machines, wood planers, motorised drills, belt sanders, electric motors, paint sprays, air compressors, circular saws, etc. Catalogue.—JOHN STEEL, Castlefields, Bingley.

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New (Slightly Soiled) 2½" 3-jaw (reversible) scroll chucks (model 32) Burnerd, reduced from £5 8s. to £3 10s. (1s. 9d. p. and p.). List supplied on request.—JOHN MORRIS (CLERKENWELL) LTD., 74, Clerkenwell Road, E.C.1.

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"Acorntools" and "Acorntools" De Luxe 5" s.s. and s.c. lathes, also "Acorntools" 7" stroke high-speed shapers and ½" capacity capstan lathes can be supplied *ex*-stock. Hire purchase terms available. Send for literature and full details to the manufacturers of these machines.—THE ACORN MACHINE TOOL CO. (1936) LTD., 610-614, Chiswick High Road, Chiswick, W.4. Tel.: 3416-7-8-9.

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Circular Milling Table, castings, drawings, 4" diameter, 2" high, 25s., c.w.o. Enquiries s.a.e.—COUPE, Kirklevington, Yarm, Yorks.

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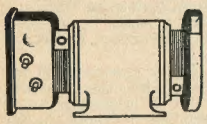

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